This Issue—Complete Report of United States Coal Commission on Anthracite

COAL AGE

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COAL AGE

The Only National Paper Devoted to Coal Mining and Coal Marketing

C. E. LESHER, *Editor*

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The Anthracite Report

WHATEVER points of difference the operators and the miners may have with the anthracite report of the Coal Commission they with the public will in the end, if not at once, recognize that Mr. Hammond and his associates have held themselves true to their trust as representatives of the public. A searching inquiry, an array of facts and impartial suggestions and recommendations characterizes the report on anthracite, carried in full in this issue of *Coal Age*. There is no "muckraking," no invective, but temperate, straight-from-the-shoulder statement of the facts as found. So many and complicated are the subjects considered that no brief summary is possible, and numerous matters of major import have been touched but lightly by the Commission at this time with the promise that they will be treated more fully in the final report due in September, which will cover the bituminous-coal industry as well.

Rejecting alike governmental ownership and operation of the anthracite mines, the Commission holds to the view that this industry is charged with a public interest. At the same time it pays public tribute to the many responsible shippers of anthracite who have conducted their business with "restraint and good judgment." The Hudson Coal Co. alone is cited as having obstructed the best efforts of the industry to function in the public interest. Publicity of accounts is recommended through a governmental agency, not so much because of past abuses but as a protection for the future, for the "Commission fears that the concentrated control of the anthracite industry may take indefensible profits." To this the majority of the hard-coal operators will not object. With the exception of the Hudson Coal Co. they have never opposed the efforts of the government to examine their accounts or to publish the results nor have they opposed legislation previously proposed looking to this end. Nor can it be held that the recommendation looking toward active governmental control of the production and distribution, and of prices and wages, during times of national emergency is a reflection on the anthracite operators. Again with the notable exception of the Hudson Coal Co. they have been active participants with the government, state and federal, in these matters in every national crisis in recent years.

The labor monopoly held by the United Mine Workers is described as fully as the natural monopoly of the holders of the unmined reserves of coal and the economic combination of the producers. It is proposed that the labor union be made responsible for its contracts, that where the operators and miners cannot agree and a suspension is in prospect, the matter in dispute be submitted to arbitration, as has been repeatedly urged by the operators and as often refused by the United Mine Workers.

The operators, too, are charged with having been derelict in looking to the human relationships that tend to bring about better understanding, and in having at times neglected discipline and insistence on efficiency in the pursuit of profitable output. Both sides may well take the advice to "wipe the slate clean" and to try out the suggested plans in a spirit of fairness and tolerance. It is plainly stated that what will in the end be the judgment of the Commission as respects the United Mine Workers will depend upon the spirit they display in the pending conferences with the hard-coal operators.

The Commission has made no startling disclosures of fact. The statistical data and the historical information are not secrets laid bare for the first time. Most of it has been published or has been available in some form by no means entirely *ex parte*. What the Commission has done is to take material from original sources and bring it forth in a form and with a preciseness and detail that will inspire public confidence. Here is an authoritative assembly of facts that while they may not settle all vexed questions in the public mind should satisfy its curiosity.

But what the public may learn from a careful study of this report will be new to most people, fed up on strange tales about the "coal barons." Profits of the producers are given in cents per ton, and judgment as to the reasonableness of from 36c. to $1.07 per ton is reserved until the corresponding investment can be determined. The mine price represents about half what the consumer pays at his curb—the remaining half is divided about equally between retail dealer and railroad. About 11c. of each dollar paid by the consumer of domestic anthracite is profit to the producer and local dealer, which on a $16 curb price gives $1.76, out of which the public pays profit to the industry on both ends and out of which must come the "gouge"!

The anthracite mine workers are not found to be downtrodden, poverty stricken slaves. On the contrary they enjoy, if they work, incomes around $1,500 to $2,000 and upward per year, live for the most part in sanitary conditions and are "no longer a submerged or exploited population." The only section of labor that suffers any measure of economic distress are the miner's laborers, whose rate of pay incidentally is largely determined by the miner himself.

The *tout ensemble* of the report will be confusing to the layman because it necessarily embraces such a wide range of subjects. There is a vast opportunity for a simpler set-up of the essential points as they affect and interest the ordinary consumer. The one simple, elemental fact that stands out is that it is strikes of the miners that are the causes of the important shortages of anthracite supply, although no attempt is yet made to assign responsibility for the strikes. Of the three parties at interest, public, operators and miners' union, each may draw a measure of consolation from the report, but the miners the least.

Anthracite Report Will Have Potent Influence on Whole Industry

By Paul Wooton

Washington Correspondent of *Coal Age*

AN HONEST, courageous document has come from the President's Coal Commission. The anthracite report, made public Monday, is destined, many believe, to exert a powerful influence on the entire coal industry. Its twenty-one recommendations indicate that the industry's ills have been diagnosed skillfully. There will be differences of opinion as to the benefits which would follow the application of these recommendations, but it must be admitted that the report suggests no resort to paternalism and places main responsibility on the persons in the industry to conduct it so that imperative public interests will be reasonably served.

The representative character of the Commission is expected to insure serious consideration of its findings by Congress, by the industry and by the public. The case of coal has been laid before a jury of six Americans. The jury forms a splendid cross-section of conservative thought in the country—a jury of men who believe in building on what we have and who take no stock in panaceas or short cuts to Utopia. They cannot be accused of being demagogues or cowards. No one could have brought pressure to bear on them successfully. Any effort to have done so would have been resented promptly and pointedly. It can be said most positively, however, that no such effort was made.

Even the President, who properly might have laid his own thought before the Commission, gave that body free rein and left it untrammeled with any instructions or suggestions. No public agency could have been more free from political influence of any kind. The report that the Attorney General had inflicted some of his ideas on the Commission was without any foundation whatever. Such a rumor was launched, it is believed, to prejudice labor against the report. Since the Attorney General is as a red flag to the United Mine Workers, there could have been no better way to embitter labor against the report than to create the idea that Mr. Daugherty contributed something to it.

The real truth of the matter is that the jury of six Americans moulded its own report. Other than the basic facts, no part of it is the product of the staff. One of the chief points of significance about the report is the fact that it represents the sober, carefully weighed conclusions of men who are representative of the American people and who have had at their disposal the most complete basic data to guide them. The conclusions that have been reached by a millionaire mining engineer, a Jeffersonian Democrat, the editor of the *Atlanta Constitution*, a down-East Yankee, a lecturer and economist reputed to be hostile to corporate interests, and a man who has steered a middle course between employer and employee for twenty years will not be greatly different from the conclusions which would be reached by the majority of American citizens if they had the same well-rounded understanding of the subject.

A mirror has been held up to the anthracite industry and to the coal business in general. Those who want to see their business as the American people see it may do so by gazing in that mirror. The anthracite situation has been analyzed without reflecting the bitterness which has characterized the relationships of the mine owners and the mine workers. There is a flavor of tolerance throughout the document. It creates an impression of sympathetic understanding, but it expresses very firmly the belief that the public has a right to be insured service by the coal industry. It is made plain that the Commission does not want that service on any terms which will not give fair profits to the owners and wages to the workers in keeping with the American standards of living. It does indicate, however, that the public is in a mood to insist on a steady supply of coal.

It stands out all through the report that the Commission conceives the anthracite business as being affected by public interest and impressed with public use—phrases used several times in the report. One of the most significant statements in the whole report is this one: "Coal is quite as much a public necessity as gas, street-railway service or any other service or commodity that has been brought under public regulation." The Commission admits that there is not sufficient basis in knowledge or experience as to just how far control or regulation should be exercised in insuring maximum service to the public by the coal industry, but the industry itself is asked to modernize its wage agreements and the machinery for interpreting them; to set up an adequate inspection service of its own; to take hold of the problem of resizing and to improve its practices generally, but it also calls upon the public to take a healthy interest in looking out for its own welfare.

The Commission does recognize that any failure on the part of the industry to discharge properly its own responsibility, thereby stopping the flow of coal long enough to imperil the public interest, would justify the government in taking over "the operation of the mines and the transportation and distribution and marketing of the product with full power to determine the wages to be paid the mine workers, the prices at which the coal shall be sold and, subject to court review, the compensation to be paid to land and mine owners." Not more than a month ago the Supreme Court of the United States, in the Kansas Industrial Court case, said that since the adoption of our Constitution the vocations of the coal miner and the coal operator have not been regarded as public callings. The utterance of the Court is a historical fact, but this jury of six representative Americans has decreed something different for the future. That jury holds "that a limited natural monopoly like anthracite, held by a relatively small number of individuals, estates and companies, and supplying a necessity of life for millions of our people cannot continue to be treated as if it were not affected by a public interest."

Of the 21 recommendations, 15 constitute disinterested counsel to men in the coal business. Two of them deal with regulation, two with emergency powers, one with the uniform ton and one is a recommendation to the Interstate Commerce Commission for an investigation of freight rates.

Full use was made of the work of the staff and of the engineering services of outside experts, but the report bears no trace of those contributions. The Commission has worked without respect for the 8-hour day. There was one sitting from 9 a.m. to 6 p.m., with no interruption for lunch.

Report of U. S. Coal Commission on Anthracite

To the President and the Congress of the United States:

The U. S. Coal Commission renders herewith as directed by law, its 'separate report on the anthracite industry.'

Both the Congress and the American people are concerned in the questions whether in the anthracite industry a reasonable return on investment can be paid to the owners and operators, decent living conditions and an adequate wage based on American standards furnished to the mine workers, a proper return made to the railroads and the dealers, and coal be delivered to the patrons of the industry at lower prices than those now charged. Furthermore, they want to know what can be done to assure an ample supply of anthracite with a constant flow from mine to consumer. Peace with justice in the industry is the first requisite and economy is the second. To these inquiries the Coal Commission has directed its attention.

Ownership or Regulation?—The fundamental fact in the anthracite coal problem is that heretofore these limited and exhaustible natural deposits have been in the absolute private possession of their legal owners, to be developed or withheld at will, to be leased for such royalties as could be exacted, to be transported and distributed at such rates and in such manner as a double-headed railroad and coal combination might find most advantageous from the point of view of private profit, to be sold at such prices as could be maintained by the restriction of output and the elimination of independent competitors, through such means as the maintenance of freight rates burdensome except to those who, owning both mines and railroads, could afford to be indifferent as to whether their revenue came from the one source or the other.

The Commission does not recommend the abolition of existing property rights, however much might be said for the view that mineral deposits should have been held from the beginning as national rather than individual property. The Commission does not recommend government ownership either by purchase at present value or by expropriation. It does, however, hold the view that a limited natural monopoly like anthracite, held by a relatively small number of individuals, estates and companies, and supplying a necessity of life for millions of our people, cannot continue to be treated as if it were not affected by a public interest.

Coal is quite as much a public necessity as gas, street-railway service, or any other service or commodity that has been brought under public regulation. There should be no secrets from the public in regard to mining costs, profits, salaries, wages or corporate relations. Banks and insurance companies are privately managed because we find by experience that they can be managed more efficiently and economically on the principle of individual responsibility. But, like railroads, they are required to report to a public authority and they are subject to such regulation in the public interest as experience may show to be necessary and public opinion may from time to time approve. The guiding principle in such enterprises is no longer maximum profit to owners but maximum service to the public.

The time has certainly come to establish the same controlling idea in the anthracite-coal industry. There is not as yet a sufficient basis in knowledge or experience to determine what form of control or regulation will ultimately be most advantageous. What is clear is that in the operation of coal mines, as in the operation of railroads, telephones, water companies or banks, the public interest must be respected and served, and that this requirement places limitation on the rights of owners of coal lands, operators, mine workers, carriers, and dealers. The Commission believes that the principle of individual and corporate responsibility should be maintained as most likely to insure economical and efficient management of the industry, and that the public interest may be adequately safeguarded by the creation of a governmental authority with power to require financial and operating reports, to prescribe uniform methods of cost accounting, and determine conditions on which coal may be shipped in interstate commerce.

The President of the United States should be authorized by act of Congress to declare that a national emergency exists whenever through failure of operators and miners in the anthracite industry to agree upon the terms of employment or for any other reason there is a suspension of mining operations, seriously interrupting the normal supply of anthracite fuel in interstate commerce; and to take over the operation of the mines and the transportation and distribution and marketing of the product, with full power to determine the wages to be paid to mine workers, the prices at which the coal shall be sold, and, subject to court review, the compensation to be paid to land- and mine-owners.

On these subjects more definite recommendations will be reserved for the final report of the Commission since they apply to both branches of the industry.

Prices.—The well-known increase in anthracite prices in the last ten years or so is frequently attributed to profiteering and frequently to increases in wages, but there have been insufficient facts available with which to measure the justice of either accusation. How great has been the actual rise in price, how this rise is related to the general price movement, what items are included in the price the consumer pays for his coal, and especially what profits come out of that price, are questions properly asked.

The average retail price of stove anthracite in 1913 in Boston and Washington was $8.25 and $7.50, respectively, the former, however, being the price of a short or net ton, the latter that of a long or gross ton. In 1923 the corresponding retail prices are $15 for Boston and $15.39 for Washington. Since 1913 the freight rates from the anthracite mines to these two cities have increased $1.25 and $1.14. Eight of the larger coal companies, most of them still closely affiliated with the railroads, are grouped together in price quotations and their product is known as "company" coal, in contrast with the "independent" coal produced by 100 or more smaller "individual" companies. In 1913 the average mine price of stove anthracite was $3.53 a gross ton; today the quotations are $8 to $8.35 a gross ton for "company" and $8.50 to $11.50 for "independent" coal.

Thus, in ten years both the retail and the wholesale prices of stove coal have practically doubled. This is in line with the general advance in commodity prices, except that while the wholesale price of metals, for instance, reached its peak in 1917; of chemicals in 1918, of farm products in 1919, and of other commodities in 1920—all with subsequent declines, usually large—the price of anthracite has continued steadily upward.

Anthracite Consumer's Dollar Analyzed—Production, Distribution and Freight Costs

The Consumer's Dollar.—An analysis of the consumer's dollar based on an examination of the books of retail dealers in several of the larger cities may serve to show the component parts of the price he paid. For example, in November, 1922, in Boston the average retail price of stove coal at the customer's curb was $15.68 a net ton. At this rate a dollar paid for 128 lb. of coal. Of this dollar 45c. represented the sales price at the mine, 23c. the charge for freight, and 32c. the share of the dealer. In New York the average price was $13.77. Here the dollar paid for 145 lb. of coal, and 56c., 18c., and 26c. represented the division between mine, railroads, and dealers. In Philadelphia the price, figured on a net ton basis was $12.93, so that the dollar paid for 155 lb. of coal, with 61c., 16c., and 23c. as the respective shares of mine, railroads, and dealers. In Washington the price figured on a net ton basis was $14.20, and the consumer's dollar paid for 141 lb. and included 58c. as mine price, 20c. as freight, and 22c. to the dealer. In Chicago, at the greater distance from the mines, the consumer's dollar paid for only 120 lb. of coal and included 49c. as mine price, 30c. as freight, and 21c. as dealers' costs and profits. In St. Louis, with a price per ton 44c. lower than in Chicago, the dollar contained only 15c. for the dealer. This abstract of a much larger exhibit is sufficient to show that from 15 to 32c. of every dollar spent for Pennsylvania anthracite remains with the local dealer or possibly in part with a wholesaler from whom he obtained the coal, and between 45c. and 60c. goes to the producer.

It is interesting to the public to know what part of the consumer's dollar commonly goes for profit of operator or retail distributor. A buyer of domestic anthracite in Boston in November, 1922, paid something like 11c. out of every dollar in the form of profit to the producer or retailer of coal. Of this about 4c. went to his local retailer and nearly 7c. to the producer, for his profit on mining and sale at wholesale. Practically the same figures hold for Washington, where the same month the householder paid 3 c. out of every dollar in profit to the retail coal merchant and nearly 9c. out of every dollar as profit to the producer and wholesale distributor of coal.

Another inquiry made by the staff of this Commission has furnished facts intended to be of immediate service to the local buyer of coal. Tables have been made public showing the present wholesale cost of stove anthracite as reported by retailers in nearly a thousand towns and cities from Maine to Minnesota. The items shown include the mine cost of the last shipment received prior to May 15, 1923; the freight charges, and the total cost of this shipment on the dealer's siding. The range of latest quotations to these dealers on May 15 are also given, from which it will be seen, for example, that in New England the more common wholesale prices quoted were from $10 to $11.50, and in Pennsylvania from $8.30 to $9.50. All these prices are necessarily given for the long or gross ton of 2,240 lb., the unit in which anthracite is sold at the mines and on which freight is paid, although in all but a few cities and towns outside of Pennsylvania the same coal is sold at retail by the short or net ton of 2,000 lb. In using this cost-to-dealer information, allowance must therefore be made on the one hand for the dealer's losses by degradation, for his cost items, and for a fair margin of profit, and, on the other, for this difference of 240 lb. in the ton used.

The Commission urges the Congress to fix a uniform standard of weight for anthracite and bituminous coal throughout the country. Bituminous coal, except in the export and tidewater business, is mined, transported and sold by the net ton of 2,000 lb. Anthracite is mined, sold at the mine, and transported by the gross ton of 2,240 lb., but is retailed in some places by the one unit and in some by the other. To guard against temporary opportunities for injustice, the change should be accompanied by the widest publicity.

Cost of Distribution.—The expense of distributing the coal is the item of cost nearest home, and yet it is an item that the consumer may overlook. The city retailer may have provided extensive storage in his coal yard or pocket and delivery trucks sufficient to meet promptly every call for immediate delivery in midwinter; the small dealer may own neither yard nor delivery equipment, simply selling from the car to the customer's own truck or a hired truck. Such a variation in service naturally involves a variation in gross margin or difference between the cost of anthracite on the dealer's siding and his price to the consumer. The field agents of this Commission have found that these margins are as high as $3.50 or more per ton and as low as $1, or even less. The larger service rendered to the city consumer includes unloading, storage, screening, and delivery.

In five of the larger cities examination of the books of dealers handling anthracite almost exclusively showed that the average gross margin per ton was $2.88 in 1920; $2.55 in 1921, and $2.41 in 1922. The average expenses of these dealers for these three years were $2.39, $2.26, and $1.99, respectively, showing a decrease since 1920, and net margins of 49, 29, and 42c. respectively for the three years. Returns received from retailers throughout the country show that in the past five years there has been in general an increase in gross margins in the later years, amounting for some dealers to $1 or more. Generally there also is a considerable diversity in the margins reported, due either to price competition among dealers or to the varying cost to dealers, depending on whether the coal was purchased from big companies or from independents or from jobbers. Were it not for these wide differences in wholesale prices the normal effect of competition would tend to narrow this spread of margins in the retail trade. The source of the anthracite, as determining the cost to the dealer, may have more to do with his success than the relative efficiency of his business organization. *The characteristic feature in the retailing of anthracite is the lack of uniformity in margins both within the same city and between cities.*

Of the anthracite domestic sizes 24 per cent is sold directly from mine to retailer or consumer, and 53 per cent through sales agents, and 20 per cent is handled by wholesalers, whose margins vary widely from city to city and from year to year. Reports from representative wholesalers in 5 cities showed an average margin of 23c. in November, 1921, and over 27c. in November, 1922. In these two months the high and low margins for individual companies were, in 1921, 70c. and 18c., and in 1922, $1.40 and 6c. One feature in this wide spread is the fact that the wholesale trade has to dispose of steam sizes, sometimes at a loss, along with the more profitable domestic sizes. The trend of wholesalers' gross margins in the last three years has been downward, with a decrease of 13c. from 1920 to 1921 and a recovery of 3½c. in 1922. Nevertheless, the margins of wholesalers and retailers in recent years have been high and they have been relatively higher on domestic sizes of anthracite than on the steam sizes of anthracite or of bituminous coal, indeed it is a fairly common practice to make up on sales of domestic anthracite any losses on steam coal.

The speculative activity of the independent wholesaler in time of shortage adds to the wide spread in the prevailing prices of anthracite, and this activity may result not only in largely increased profits for individual jobbers but in pyramiding profits by multiple sales among jobbers. The Commission's study of carloads of high priced coal selected at random from shipments to New England during the past fall and winter disclosed considerable buying and selling among jobbers with consequent pyramiding of their margins, varying on different sales from 15c. to $4.25, the amount which a Boston jobber in December, 1922, added to the $9 mine price of a car of stove anthracite. A considerable number of sales were reported at margins from 75c. to $1.50 a gross ton. It must not be forgotten that the jobber of this type physically handles no coal whatever; his is only a credit and bookkeeping business.

Freight Charges.—The item of freight alone in the examples cited takes from 16 to 30c. of the consumer's dollar. The question whether or not the existing freight rates on anthracite are excessive is one that comes under the jurisdiction of the Interstate Commerce Commission. The three years painstaking investigation of these rates by that body, on which its decision of July 30, 1915, was based, developed the pertinent fact that all the conditions in the transportation of anthracite—the vast quantities in trains of maximum tonnage and in cars of large capacity originating with relatively large shippers—tend toward lower operating costs. More than forty years ago President Gowen of the Philadelphia & Reading referred to this traffic as "very profitable," and in later years anthracite has been termed by the carriers their "backbone traffic." Throughout the history of the industry there has been no change in the attitude of the carriers toward this very desirable business, the active competition for which explains most of the history of combination.

As so large a part of the anthracite consumer's dollar goes as freight charges, a material reduction in the price of coal might come through a reduction of freight rates. With a keen appreciation of the public demand for the scrutiny of every item in the cost of anthracite, the Coal Commission urges upon the Interstate Commerce Commission, the duly constituted agency of the Federal Government, a re-examination of the reasonableness of anthracite freight rates. The pending separation of carriers and mining companies in the three larger systems makes opportune the reconsideration of the subject by the Interstate Commerce Commission.

Cost of Mining.—The mine price of anthracite, which is the first item of cost on the retailers books, is an item concerning which the consumer rightly desires unbiased testimony. The Commission has obtained reports on costs,

sales realizations, and margins covering the period Jan. 1, 1919, to March 31, 1923, from all but one of the important operators. (Reports covering operations of the Delaware, Lackawanna & Western R.R. Co. during part of this period have yet to be received.) By making certain allowances for differences in accounting practice these reports can be compared with returns made by the same companies to the Federal Trade Commission for the years 1917 and 1918. For twelve companies—nine railroad coal companies and three large independents shipping from 60 to 70 per cent of the total anthracite—the comparison can be carried back to 1913. The cost figures here presented for the years beginning with 1919 are those reported to the Coal Commission by the operators without revision.

The mine cost as it stands on the books of each mining company and as reported by the company represents the average cost of the total output, all sizes, of anthracite. Egg coal has, for example, at least five times the market value of barley, but these sizes are mined together and their costs cannot be separated. Mine costs directly reflect the conditions under which these deposits of coal are recovered for the use of man. Even within the few counties in which anthracite is found there is a conspicuous range of natural conditions, involving economic and even social consequences.

The distinction between the Northern, Middle, and Southern field, or, as they are also termed, the Wyoming, Lehigh, and Schuylkill regions, is primarily geologic and topographic, but the effects of the natural conditions largely control costs. The attitude of the rock beds, including the seams of anthracite, practically determines the method of mining the coal and the type of mine equipment, which in turn involve a corresponding variation in costs of mining and even in the skill of mine workers. The contrast is great between some of the level-lying beds of moderate but fairly constant thickness under the broad Wyoming Valley, where mining and underground haulage present relatively simple problems to the engineer, and the steeply pitching or overturned and faulted beds of changing thickness in the Schuylkill field, where crushed coal and treacherous roof multiply the difficulties of mining and increase the unavoidable waste. Even more direct is the connection between geologic processes working in the past and the differences in the character of the coal as mined today, the varying proportions of large and small sizes demanding in turn differences in preparation and resulting in corresponding differences in marketing problems and in average prices realized for the product of the mines.

Waste in Mining.—The engineering staff of the Commission has carefully studied the subject of waste and has determined the proportion of the coal deposit which is lost in the processes of mining and preparation. It is gratifying to find that while forty years ago estimates of the percentage of recovery were 27 per cent to 40 per cent, and twenty years later the Roosevelt Commission predicted that with better mining methods and the utilization of former waste material a 50 per cent recovery could be expected in the near future, the present study shows that this estimated higher recovery has been in fact exceeded, and that the practice of today in mining and preparing the coal for market yields an average recovery of about 61 per cent, the greater percentage of waste being in the Southern Field, where the steeply pitching beds of crushed coal place a natural limitation on recovery. It must be kept in mind, however, that this type of conservation engineering, which increases the percentage of recovery and adds to the expected life of the limited reserves of anthracite in the ground, may involve an increase in the cost of mining.

It is found that all the factors involved in mining costs contribute to the increase in mine prices. In the 10 years under review by the Commission's accounting staff, labor costs in the production of fresh-mined coal have risen from $1.56 a gross ton in 1913 to $4.12 in the first quarter of 1923, the cost of supplies from 35 to 71 cents, and general expenses from 32 to 92 cents. Labor cost bears about the same relation to total mine cost in 1923 (71.7 per cent) as in 1913 (70 per cent); supplies cost relatively less in 1923; and general expenses are relatively higher in 1923.

The total range in the average mine cost of a ton of coal with the nine railroad companies has been from $2.23 in 1913 to $5.75 in 1923. With three independent companies for which there are continuous cost records, the corresponding change has been from an average cost of $2.50 in 1913 to $6.32 in 1923. Examined in detail, the increase in mine costs for these twelve companies was moderate until 1918, when for three successive years there was an annual jump of approximately a dollar. To these increases, changes in wage rates, rising prices for supplies, and increasing charges for royalty and depletion have all contributed, and the discussion of the first and largest item, labor costs, leads to the most extensive inquiry which this Commission has undertaken, covering the living conditions of the miners' families and the earnings and other labor conditions of the mine workers.

Sociological Studies—Composition of Mining Population, Living Costs and Wage Rates

The Census of Mining Population.—The decennial Federal Census secures and publishes much valuable information regarding the population as a whole which it is not practicable to present by industries in the general census report. With the consent and the co-operation of the Director of the Census, agents of the Commission have gone to the original schedules returned by the enumerators during the census of 1920 and have taken therefrom certain information relating to the nationality, places of domicile, ages, marital status, etc., of mine workers.

The 1920 returns show 147,456 anthracite mine workers. These together with their families number aproximately five hundred thousand persons. The mine workers themselves constitute about one-half of the occupied males in the communities in which the mine workers live; and they and their households together constitute about one-half of the populations of the counties in which the anthracite coal fields lie.

Of these 147,456 mine workers, 102,485 live in incorporated towns or cities of a population of 2,500 or over. The remaining 44,971 live in communities of less than 2,500 population. The census thus classified 69.5 per cent as urban and 30.5 per cent as rural. Of the urban population, 16,456, or 11.2 per cent of the total number of mine workers, live in places of 50,000 or more population; 41,526, or 28.2 per cent, in places of from 10,000 to 50,000; 30,629, or 20.8 per cent, in places of from 5,000 to 10,000; and 13,874, or 9.4 per cent, in places of from 2,500 to 5,000. The small, isolated mining community, located on the company property, unincorporated and company controlled, and not easily accessible by trolleys, such as are found in the bituminous fields, is exceptional in the anthracite field. While 98 company-controlled communities were reported less than 15,000 mine workers were living in these communities; and less than 7,000 of these were living in communities that are as much as two miles from an incorporated town of a population of 2,500 or over.

Railroad service is frequent and interurban trolleys connect up the towns in the greater part of the anthracite field. Thus approximately 90 per cent of the anthracite mine workers live in communities that are independent of the employing companies. They live just as the mass of other Americans live, in free self-governing communities where their civic rights are within their own keeping. Comparatively few of the mine workers live in company-owned houses so that they are free to go from one mine to another to work without its having any effect on the tenure of their domicile. Very many of the mine workers live a good ways from their work and go back and forth by trolley just as workers in our cities do. It is not unusual to find them trollying back and forth to and from their work anywhere from five to ten or twelve miles.

In connection with the study of the kinds of communities in which the mine workers live, a study was made of the extent to which they lived in company-owned houses. Reports secured from 124 out of 129 mining companies showed that 112 of these companies owned dwelling houses. The number of employees reported as on the payrolls of these 124 companies is 162,724. This number is some 15,000 greater than the number reported in the census. But the larger figure represents a date in the early part of the present year, 1923, while the census represents a period in 1920. The 112 companies out of the 124 that reported ownership of company houses represented 98 per cent of the employees of the 124 companies; and these 124 companies employed approximately 98 per cent of the total number of anthracite workers. This report on company-owned houses, therefore, covers 96 per cent of all the mine workers.

The total number of family dwellings reported by these 124 companies was 10,246; and the number of mine workers living in these company-owned dwellings was 15,486, or 9.7 per cent of the total number of mine workers employed by the 124 reporting companies. Less than 10 per cent of the total of all anthracite mine workers are thus shown to be living in company-owned dwellings. This is one of the few items in which there are any perceptible differences between the divisions of the anthracite fields, as only 5.3 per cent of the employees in Northern field are reported as living in company-owned houses as against 15.8 per cent in the Central and Southern fields taken together. Of the 10,246 company-owned dwellings, 3,156 (housing 4,696 mine workers) are located in incorporated places of 2,500 or more population.

Of the 147,456 mine workers reported by the 1920 census, 2,039, or 1.4 per cent were under 16 years of age; 8,690, or 5.9 per cent were sixteen or seventeen years of age; 7,974, or 5.4 per cent, were eighteen or nineteen yars of age; 17,393, or 11.8 per cent were from 20 to 25 years; 39,334, or 26.7 per cent, were from 25 to 35 years; 35,413, or 24 per cent, were from 35 to 45 years; 23,994 or 16.3 per cent, were from 45 to 55 years; 9,825, or 6.7 per cent, were from 55 to 65 years; and 2,660, or 1.8 per cent, were 65 years of age or over. The age of the remaining 134 was reported as unknown.

Nationality and Citizenship.—Of the mine workers reported by the 1920 census, 69,645 were native-born whites, 46 were native-

born colored, while 77,765 were foreign born. Thus 47.3 per cent of the total number of mine workers were native born as against 52.7 per cent foreign born. Of this 77,765 foreign born, 26,562, or 18 per cent of the total number of mine workers, were born in Poland; 15,450, or 10.5 per cent were born in Russia; 9,645, or 6.5 per cent, in Italy; 8,333, or 5.7 per cent, in Austria; 7,356, or 5 per cent, in the British Isles; 5,330, or 3.6 per cent, in Slovakia; 1,700, or 1.2 per cent, in Hungary; 1,286, or 0.9 per cent, in Germany; the remaining 2,103, or 1.4 per cent of the total mine workers, were born in countries other than given above. Approximately 42,000, or 28.5 per cent of all the mine workers reported in the census, were of Polish or of Russian birth; and of the total foreign born, approximately 55 per cent have been furnished by these two countries.

Of the 77,765 foreign-born mine workers, only 431, or 0.6 per cent had been in the United States less than five years at the time of the 1920 census; 14,275, or 18.4 per cent had been here from five years up to ten; 17,330, or 22.3 per cent, had been here from ten to fifteen years; 16,007, or 20.6 per cent had been here from fifteen to twenty years; 27,620, or 35.5 per cent, had been here twenty years or over; while the years of residence of 2,102, or 2.7 per cent, is reported as unknown. These figures indicate that for the three five-year periods from 1900 to 1915 there was a steady and fairly uniform flow of foreign-born workers into the anthracite fields. In the five-year period from 1915 to 1920 there was an almost complete cessation of this flow as well as an exodus from these fields.

Of the above-described foreign-born mine workers, 31,446, or 40.4 per cent, had become naturalized by 1920; 10,483, or 13.5 per cent, had taken out first papers; while 34,322, or 44.1 per cent, had remained alien, not having even made a declaration of intention to become citizens. These percentages are based on the total number of foreign-born mine workers reported by the census, while the age figures of mine workers show that 10,729, or 7.3 per cent of the total number, were under eighteen years of age, there are only 996 foreign-born mine workers in the group under eighteen. Formal declaration of intention to become a citizen can be made at the age of eighteen, although naturalization cannot be obtained before twenty-one. The foreign born under eighteen should, therefore, be disregarded in computing the percentage of naturalization figures. But making allowance for those under eighteen years, the percentage of foreign born who have remained completely alien would remain approximately 44 per cent.

Of the 69,691 mine workers born in the United States, 98.9 per cent can read and write. Of the 7,431 born in the British Isles, 95.4 per cent can read and write; while of the 70,334 born in countries other than those given, 45,477, or 64.7 per cent, can read and write, 2,319, or 3.3 per cent, can read but not write, and 22,538, or 32 per cent, can neither read nor write. Further, 9,824, or 14 per cent of those born in countries other than the United States and the British Isles, do not speak English. When it is remembered that 99.4 per cent of the mine workers had been in the United States five years or more, this appears a high percentage unable to speak English; and this fact takes on an added significance when we consider the hazardous nature of the occupations in which they are engaged. Over 22,500 of the foreign born cannot read any language, so that safety notices or instructions would be meaningless to them; and nearly 10,000 of them cannot speak English and would have difficulty in understanding their foremen unless these spoke their particular language. These figures suggest, therefore that there has been remissness somewhere in the matter of teaching the foreign born the language of the country, just as there appears also a lack of energy on the part of the various organizations that might properly be looked to in the matter of stimulating their interest in acquiring American citizenship.

Social Status.—Of the total mine workers reported by the census, 83,877 were maintaining homes. Of the 69,691 native born, 30,605, or 43.9 per cent, were maintaining homes; of the 77,765 foreign born, 53,272, or 68.5 per cent, were maintaining homes. A very much larger percentage of the foreign born are maintaining independent homes than of the native born.

TABLE I—MARITAL AND DOMICILE STATUS OF THE TWO GROUPS MAINTAINING HOMES

	Native born		Foreign born	
	No.	Per cent	No.	Per cent
Single	2,345	7.7	581	1.1
Married, wife present	27,213	88.9	51,103	95.9
Married, wife not present	178	.6	364	.7
Widowed or divorced	850	2.8	1,212	2.3
Marital status unknown	19	....	12	....

TABLE II—MARITAL AND DOMICILE STATUS OF 63,579 MINE WORKERS NOT MAINTAINING SEPARATE HOMES.

	Native born		Foreign born	
	No.	Per cent	No.	Per cent
Total boarding with family	30,390	....	3,702	....
Single	29,632	97.5	3,579	96.7
Married, wife present	84	.3	4	.1
Married, wife not present	313	1.	56	1.5
Widowed or divorced	170	.6	40	1.1
Marital status unknown	191	.6	23	.6
Total boarding with a family other than their own	8,696	....	20,791	....
Single	5,671	65.2	12,770	61.4
Married, wife present	1,681	19.4	935	4.5
Married, wife not present	453	5.2	5,590	26.9
Widowed or divorced	868	9.9	1,414	6.8
Marital status unknown	23	.3	82	.4

Out of 39,086 native-born workers who are not maintaining homes, 30,390 are boarding with a family of which they are a part; while out of 24,493 foreign-born workers who are not maintaining homes only 3,702 are boarding with such family.

Of the 83,877 mine workers who maintain homes, 27,142, or 32.4 per cent, own their homes. Of this number, 8,734 are native born and 18,402 are foreign born. Of the native born who maintain homes, 28.8 per cent own their homes; of the foreign born who maintain homes, 34.5 per cent own their homes. Of the homes owned, 64.5 per cent are free of mortgages, and this percentage applies approximately alike to both native and foreign born.

TABLE III—PERCENTAGE OF FAMILIES MAINTAINING HOMES AND NUMBER OF CHILDREN

	Tot—l Main-ta'ing Homes	Percentage of mine-workers maintaining homes who have specified number of children								
		None	One	Two	Three	Four	Five	Dix	Seven	Over Seven
Native and foreign born	83,877	13.1	14.4	16.8	15.9	13.4	10.6	7.4	4.3	4.1
Native born..	30,605	19.	20.2	19.2	14.6	10.3	7.3	4.6	2.5	2.4
Foreign born..	53,272	9.7	11.1	15.4	16.6	15.2	12.5	9.	5.4	5.1

As shown above, there are 30,605 native-born mine workers who maintain homes. In 62.4 per cent of the families maintained in these homes there is only one member gainfully employed, that is engaged in an occupation from which he secures a money return; in 22.6 per cent of these families there are two members gainfully employed; in 8.8 per cent there are three members so employed; in the remaining 6.2 per cent there are four or more members gainfully employed. In 50.8 per cent of the families of the 53,272 foreign-born workers who maintain homes there is only one member gainfully employed; in 28.8 per cent there are two such members; in 11.6 per cent there are three, and in the remaining 7.8 per cent there are four or more members gainfully employed. These figures show a marked difference between the native and foreign born, as nearly two-thirds of the families maintained in homes by native-born mine workers are supported by the work of a single breadwinner while this is the case in only one-half of the families maintained in homes by the foreign-born mine workers.

In a very considerable number of cases the additional worker in the family aside from the father is the mother. As already shown, of the families maintained in homes by 30,605 native-born mine workers, there are 11,497 in which there were two or more members gainfully employed. But it also develops that the wives of 4,405 native-born mine workers who maintain homes are gainfully employed as well as their husbands. This leaves 7,092 families of native-born mine workers whose support is contributed to by members other than the father and mother. Of the families maintained in homes by the 53,272 foreign-born mine workers, there are 26,187 in which two or more members are gainfully employed. In 12,138 of these families the wife of the mine worker is reported as gainfully employed as well as the husband, leaving 14,049 families maintained in homes by foreign-born mine workers to the support of which a member other than the father or mother contributes.

There are 27,144 native-born mine workers who maintain homes with the wife present, and 83.8 per cent of these homes the wife is not employed in any gainful occupation. Of the 16.2 per cent of wives who are reported as gainfully employed all except 109, or 0.4 per cent, are employed in work within their own homes. The occupations of the 109 require them to go out from their homes to other places of work.

There are 51,041 foreign-born mine workers who maintain homes with the wife present and in 76.2 per cent of these homes the wife is reported as not employed in gainful occupation. As in the case of native-born workers, practically all of the wives of these foreign-born workers who are reported as gainfully employed are so employed within their own homes. Of the 23.8 per cent of the wives reported gainfully employed only 159, or 0.3 per cent, are reported as in occupations that take them out of their homes.

Of the 30,605 homes maintained by native-born mine workers, boarders or lodgers were taken in 4,955, or 16.2 per cent. Of the 53,272 homes maintained by foreign-born workers boarders or lodgers were taken in 12,308, or 23.1 per cent. Of these families taking boarders or lodgers, 58 per cent of the native born and 53 per cent of the foreign born took only one such boarder or lodger; 23.5 per cent of the native born and 26.7 per cent of the foreign born took two; 10.8 per cent of the native born and 11.2 per cent of the foreign born took three, and 7.7 per cent of the native born and 9 per cent of the foreign born took four or more boarders or lodgers.

Cost of Living.—In order to measure wages against cost of living in the anthracite fields an investigation was made of the principal items of expense in mine workers' families.

A list of the food supplies purchased by 550 families for six months last winter (October-March) was obtained from storekeepers' records, and prices of foods on Dec. 15, 1922, were secured from 83 stores patronized by the families of 16,469 mine workers, numbering approximately 100,000 people. The lowest prices were found in the cities of 2,500-10,000 population; the highest in the small mining village, with the cities of Wilkes-Barre and Scranton not far behind. In the small village the winter's supply of food cost 2 per cent more than in the two large anthracite cities; in the towns of 10,000-50,000 it cost 3 per cent less, and in the smaller towns of 2,500-10,000 it cost 4 per cent less.

Compared with prices in Philadelphia and Pittsburgh, as collected for the same date by the U. S. Bureau of Labor Statistics at stores located among wage-earning population, it was found that it cost something like 10 per cent more in Scranton and Wilkes-Barre than in Philadelphia; 11.4 per cent more than in Pittsburgh; and that in the group of anthracite towns where the prices were lowest they were 3½ per cent higher than in Philadelphia, and 4.8 per cent higher than in Pittsburgh.

It is not practicable to compare the cost of clothing, furniture and similar items in the same way, because of the difficulty of finding identical articles in different places.

It was discovered, however, that retail dealers in the smaller mining villages allowed for higher gross margins in fixing prices than are usually allowed, for example by merchants in Washington, on many items of wearing apparel, notably men's shoes, men's underwear and goods sold by the yard.

Rent ranks next to food and clothing in the expenditures of the anthracite miner's family. Among the 712 families whose budgets were secured, those paying rent in Scranton and Wilkes-Barre paid on the average $14.71 per month; those in cities of 10,000-50,000 paid $14.39, whereas families in cities of 2,500-10,000 paid $11.36. The rent for company-owned houses was always less than for others, the average paid being $5.57. A comparison of rentals, even in the same region, is difficult, because so much depends on the location, the equipment and the state of repair of the particular house. The prevailing type of dwelling occupied by anthracite-mine workers is a two-story frame detached house of five or six rooms. Such a house with running water in the kitchen and electricity will rent for $20 if favorably located and in good repair, while one of the same description located on the flats may rent for only $10.

Excluding families living in company houses, the prevailing rent in Scranton and in the towns of 2,500-10,000 population was $10 and $12; in the cities of 10,000-50,000 it was $15. These rents are for houses without a bathroom, to secure which adds approximately $5 a month to the rent, aside from the extra cost of the water connection. As a matter of fact, however, a bathroom is the exception in the houses offered for rent in the anthracite region, and even if a miner wishes to meet the additional expense he would at present have difficulty in finding a house with it.

In the purchase of coal the mine worker's family had an advantage. The average price paid by them for chestnut coal delivered in Scranton in December, 1922, was $7.30, and it averaged $6.71 per ton in cities of from 2,500 to 10,000 population.

Taxes were found to be an appreciable amount in the family expenses of the mine worker. Every adult person in the anthracite region pays a direct tax. An occupational tax must be paid by every miner and a school tax by both the miner and his wife, whether or not they own property. Among the families studied taxes represented about 2 per cent of total expenses.

These topics and others connected with the cost of living are discussed more fully in an appendix to this report, but a summary table is included here, showing the principal items of expense last winter in the budgets of the 712 families interviewed by agents of the Commission. The budgets covered the six months beginning Oct. 1, 1922. In the table the 712 families are divided into four groups, according to the amount of income.

TABLE IV—MONTHLY DISBURSEMENTS OF ANTHRACITE MINE WORKERS' FAMILIES DISTRIBUTED ACCORDING TO INCOME OF FAMILIES

	Family Income Less Than $100		Family Income $100 and Under $150		Family Income $150 and Under $200		Family Income $200 and Over	
Expenses:	No. Families	Disbursed per Family	No. Families	Disbursed per Family	No. Families	Disbursed per Family	No Families	Disbursed per Family
Rent	37	$13.24	152	$13.51	160	$13.06	74	$14.60
Fuel	55	5.53	217	6.57	224	7.10	186	8.37
Gas, electricity or kerosene	56	1.90	217	1.86	225	2.08	195	2.53
Water	20	.97	88	.92	92	1.25	130	1.26
Taxes	45	2.72	194	3.04	217	3.19	187	5.11
Food, clothing, personal supplies, upkeep of household equipment	56	49.55	225	80.93	236	115.40	195	184.67
Maintenance of health (physician, hospital, nurse, dentist, oculist, glasses, prepared or prescribed medicines	46	5.83	168	7.17	191	9.50	157	11.18
Education (parochial, private schools, school books, music lessons	8	3.04	42	3.37	53	5.63	42	4.11
Church contributions	34	1.96	166	2.62	158	2.54	160	3.61
Labor organizations	55	1.44	218	1.48	233	1.93	191	1.95
Other organizations	18	1.77	87	1.50	65	2.60	87	2.53
Carfare	26	2.14	132	2.49	152	2.64	127	3.76
Recreation	23	3.94	124	3.21	141	5.89	137	13.54
Insurance	46	4.94	207	5.16	214	6.73	179	7.47
All other items	16	7.39	71	4.01	77	11.59	76	17.04
Totals	56	85.32	225	120.34	236	165.10	195	247.79
Debts paid	13	14.45	72	18.58	76	26.35	77	30.66
Investments:								
Payments on houses	3	23.33	23	31.40	25	42.27	33	37.17
Other investments	..	.....	...	.....	...	.....	1	29.17
Bank deposits	2	1.00	17	12.05	28	20.28	33	28.20

The income as well as the expenses of the 712 families interviewed by the agents of the Commission was secured from the mine worker or his wife and the wages of the mine workers were checked against the payroll. The chief wage earner in every family was employed in the mines. In 33 per cent of these families he was a contract miner; in 34 per cent he was a company miner or a skilled or semi-skilled day worker; in 33 per cent of the families he was classified as a laborer. These proportions are approximately the same as they are in the total body of mine workers. Sixty per cent of the mine workers in these families worked the entire 26 weeks covered by the study; 20 per cent worked from 22 to 26 weeks, and only 23, or approximately 3 per cent, were employed in the mines for less than half of the period. The lack of employment was due in large part to the failure of certain mines to reopen when the strike was ended because of the "cave-in" law which was then being contested in the courts and which has since been annulled.

The prevailing household was one of six members—usually four children with the father and the mother, but sometimes three children and an adult relative or a boarder. Half the families were dependent entirely on the father's earnings in or about the mines, while the other half had some additional income either from boarders or from earnings outside the home by other members of the family. About a quarter took boarders. The custom of turning the weekly pay envelope over to the mother prevailed in most of the families, and in all but a few cases, therefore, the earnings of the various members of the family were spent or distributed by her for the benefit of the family as a whole.

Exclusive of families living in company-owned "patches," one in every ten families owned a house other than the one occupied and secured some income—about $15 a month—from rentals.

Taken together, the families depended for 80 per cent of their income on the father's earnings; 11 per cent was added by other members of the family earning outside the home; 8 per cent was secured by the mother through keeping boarders, and 1 per cent came from investments.

The average income from all sources was approximately $176 per month; 41 per cent had as much as this or more; 59 per cent had less. Nine families, or 1.2 per cent of the total families visited, had an average monthly income during the six months of less than $75; forty-seven families, or 6.6 per cent, had from $75 to $100; ninety-nine families, or 14 per cent, had from $100 to $125; one hundred and twenty-seven, or 17.8 per cent, had from $125 to $150; one hundred and thirty-seven, or 19.2 per cent had from $150 to $175; one hundred, or 14.1 per cent had from $175 to $200; and one hundred and ninety-three, or 27.1 per cent, had $200 or over.

Occupational Names.—To facilitate understanding of the labor sections of this report an explanation is given of terms peculiar to the anthracite industry. Pick and machine miners, together with their assistants, are paid on a piece-rate basis and are what would be termed in other industries *piece workers*. In this report they are referred to as either *contract* men or *tonnage* men. While some contract miners are paid by the *car* and others by the *yard*, instead of by the *ton*, they are all grouped together under the term *tonnage* men. Every colliery has some miners, employed in various kinds of work, who are paid by the hour and not by the piece. These are called *company* miners, and are included under day workers, and not under tonnage or contract men.

There is a third class of miners, between the contract miner and the company miner. These are contract miners who because of abnormal conditions in their working places have been placed temporarily on a day rate, usually somewhat above the day rate of company miners. The rates at which they are paid are known locally as *consideration* rates and these miners are called *consideration* miners during the time they are on the day rate. But as ordinarily they are on a day rate for a comparatively short time and go back to their contract rates as soon as conditions in their working place become normal, their earnings on the whole represent the earnings of piece workers rather than day workers. In the tables, therefore, they have been grouped with contract miners.

Most miners employ a *laborer* who is an employee of the miner and not of the company. These *laborers* load the coal blasted down by the miner, assist him in his work and are employed, disciplined or dismissed by the miner. They usually are paid a percentage of the miner's earnings. The miner turns in a statement of the amount due his laborer and this amount is deducted by the company from the miner's earnings and paid to the laborer directly by the company. The miner's laborers are piece workers and are included under the general term *contract* men or *tonnage* men. Practically all the other employees around the mines are paid by the day or hour and are, therefore, time workers. These time workers are referred to sometimes as *day men* but more frequently as *company* men.

All contract men, or tonnage men, are underground workers. *Company* men, or *day* men, are subdivided into *inside* men and *outside* men, according to whether their working places are under ground or on the surface.

Development of Wage Rates.—From the standpoint of industrial relations, and for an understanding of the present structure of wage rates in the anthracite industry as well as the relation of these rates to changing living conditions, it is necessary to take the award of the Anthracite Coal Strike Commission in 1903 as dividing the history of wage making into two distinct periods.

The labor organizations that had been a strong factor in the industry in the seventies had disappeared by 1880, and the steady inflow of widely differing races from Europe, beginning at this time, made any immediate reorganization of the wage earners practically impossible. For the twenty years prior to 1900 therefore, contract rates, wage rates and conditions of employment were determined not by collective bargaining but by the individual employee seeking employment pitted against the individual management. The industry was demoralized by an oversupply of labor and by an overdevelopment of the mines, with the result of both a low wage rate and a limited opportunity for work.

In the five years ending 1895 the mines had averaged only 197 working days per year, and in the five-year period ending 1900 had averaged only 160 days. Thus, in the first period they had worked less than two-thirds of the working days of a year, and in the second barely more than one-half. But this does not mean that the collieries worked this number of days consecutively and that the employees were accordingly free to find other employment the rest of the year. The starts made by collieries were generally scattered throughout the year, a few days in one week, a few in another, just as is the case in much of the bituminous field at the present time. Even when the whistle called the mine workers to the colliery to begin a day they could not assume that it meant a full day's work.

Figures published in the report of the Anthracite Strike Commission reflect the situation for the year 1901, in which the anthracite mines together average 196 working days. One of the large companies, in its colliery that made the best showing, reported 288 starts within the year; but all starts taken together equalled only 232 full ten-hour days. In another colliery making 286 starts the total time represented by these starts equalled only 178 ten-hour days. In another instance a colliery making 227 starts worked only the equivalent of 102 ten-hour days. Under such conditions it was inevitable that the wage structure which had grown up during the twenty years prior to 1900 should be more or less haphazard and that the differentials between collieries for the same occupations and within a colliery as between different occupations should be somewhat erratic.

A partial organization of the anthracite workers was effected by the United Mine Workers by 1900 and a strike in that year resulted in a 10-per cent increase for all mine workers, but left the wage structure and working conditions otherwise unchanged. The Anthracite Coal Strike Commission, appointed in October, 1902, as a result of the nearly six months strike of that year, handed down an award fixing wage rates and working conditions for a period of three years from April 1, 1903. Special provisions were made for certain limited classes of employees, but the great bulk of the mine workers came under one or the other of two general provisions of the Award. Contract miners and their laborers secured a flat increase of 10 per cent in their rates. Company men, not covered in the special provisions, were given a nine-hour day with the same wages for the nine hours that they had been receiving for their former ten-hour day.

The award also provided for a sliding scale giving to all classes of workers a further increase of 1 per cent on their rates for each 5c. increase above $4.50 in the selling price of prepared sizes of coal at New York harbor. This sliding scale gave an average increase of approximately 45 per cent during the nine years it continued in existence. The award represented an actual increase in earnings of contract miners and their laborers, if they could send out as many cars of coal in the nine hours as they had sent out in ten hours; and many, if not most of them did. But while the provision of the award reducing the company men's day from ten to nine hours gave these employees an increase of 11 per cent in their *hourly rates*, it gave them no actual increase in *earnings* if they worked no more days per year than they had been working. It merely allowed them to earn in nine hours the same amount that they had formerly earned in ten.

In 1906, after a suspension of nearly five weeks, an agreement was reached to continue the award of the commission in effect without change for another three-year period. Again in 1909 the award was continued for another three-year period with a few changes which, however, did not affect either wages or hours. In 1912, after a suspension of over five weeks, an agreement was entered into for four years which gave an increase of 10 per cent to all classes of employees, but as this agreement also abolished the sliding scale under which the mine workers had secured approximately 4.5 per cent, their *net* increase was around 5½ per cent.

In 1916 a new agreement was entered into running for another four years and expiring March 31, 1920. This agreement gave to the great bulk of the company men an eight-hour day, with the same wages as they had been receiving for nine hours, and gave an increase of 3 per cent on top of this. To certain other company men who received no reduction of hours it gave an increase of 7 per cent, and it gave an increase of 7 per cent to contract workers. The increase to the day workers who had received a reduction in hours from nine to eight, plus 3 per cent, was an increase of approximately 16 per cent in their *hourly rates;* but it was an increase of only 3 per cent in their actual *earnings* per day. As in the case of the award of the commission in 1902, the reduction in hours gave no actual increase in a day's *earnings* but allowed company men to earn in a day shortened by one hour the same amount they had earned in their longer day.

Although this agreement ran to March 31, 1920, the rapid and unprecedented increase in the cost of living brought on by our entrance into the war, and the difficulty of maintaining an adequate force of mine workers in the face of wages being paid in outside industries, led the parties to the agreement, in conference with the Federal Fuel Administrator [*sic*] to enter into a supplementary agreement effective May 1, 1917, which gave increases to all classes of workers.

The effects of this series of agreements may be summarized in terms of the increase per dollar of earnings which they brought to the different classes of mine workers. For the contract miner and his laborer, assuming that they were able to send out as many cars of coal in the eight- and nine-hour day as they did in the ten-hour day, the dollar of earnings of April 1, 1902, was increased by the award of the commission of 1903 to approximately $1.15; by the agreement of 1912 to $1.21, and by the agreement of 1916 to approximately $1.30; a total increase of 30 per cent.

For the company men, or day men, the effect of these increases is very different, according to whether we consider their *hourly rates* or their *day's earnings*. The effect on the *hourly rates* was to increase the dollar of 1902 to $1.16 in 1903, $1.22 in 1912 and $1.42 in 1916—a total increase of 42 per cent as compared with the increase of 30 per cent for contract miners and their laborers. But this 42 per cent increase in the *hourly rate* of company men was not necessarily reflected by any means in their actual earnings.

The reduction in hours given them in 1902 and again in 1912 gave no actual increase in a *day's earnings*, so that the increase in earning power of company men from 1902 up to May, 1917, would have been only 13.3 per cent if the mines had continued to work the same number of days as they worked in 1902 and 1903. There was, however, a considerable increase in the number of days worked per year in 1916 and thereafter as compared with the period prior to 1903. The number of days worked by all the anthracite mines in the five-year period ending in 1902 averaged 167 per year, while in the five-year period prior to 1917 the average was 243 days. The economic conditions of the mine workers had been bettered between 1902 and 1917 by this increase in their opportunity to work more than it was by increases in rates.

The supplementary agreement of May 1, 1917, gave increases in rates to all classes of mine workers. Another supplemental agreement in November, 1917, gave new increases; a third in November, 1918, gave still further increases, and an agreement in September, 1919, continued these increases in effect until March 31, 1920. The agreement of November, 1918, gave to contract workers an increase of 40 per cent and to various classes of company men increases of $1.80, $2 and $2.20, respectively, over their rates as fixed in the agreement of May, 1916.

On March 31, 1920, the operators and mine workers had been unable to agree upon a new contract to replace the one expiring on that date. Fruitless negotiations were continued until June 1, when it was mutually agreed to submit the matters in controversy to a commission appointed by President Wilson. On Sept. 2, 1920, the operators and mine workers entered into a new agreement incorporating the award of this commission, this contract being retroactive to April 1.

The outstanding increases given in this 1920 contract are as follows: Contract miners were given an increase of 65 per cent over the rates established by the agreement of May 5, 1916. All increases of $1.80, $2 and $2.20 per day granted to the different classes of day workers respectively by the supplemental agreements made during the war period were retained. To the new rates made up by the addition of these respective increases to the rates of 1916 a further increase of 17 per cent was added. Another provision of the contract fixed a minimum wage of 52½c. per hour for all company men whose rate under the agreement of May 5, 1916, was $1.54½ or more per day, thus fixing a minimum of $4.20 per day for those covered by this provision. The hourly rate of company men receiving less than $1.54½ per day under the agreement of May 5, 1916, was increased 4c. per hour.

This agreement ran until March 31, 1922. After a five months' suspension, beginning April 1, 1922, it was continued in effect until Aug. 31, 1923.

The actual wage rates in effect for company men during March, 1923, were secured for 53,159 company men from 180 collieries distributed through the three anthracite fields. Of these, 24,087 were outside men and 29,072 inside men. All weekly or daily rates reported were, for purposes of comparison reduced to an hourly basis. While there is a very wide range in these rates—from 23c. an hour to $1.11 an hour—the real range is between 27 and 71c. per hour, only one employee being reported as below 27c. and only 977 above 71c. Of these above 71c., only 26 are above 89c. These 53,158 workers fall into four groups as follows:

TABLE V—NUMBER OF ANTHRACITE MINE WORKERS RECEIVING SPECIFIED RATES PER HOUR.

	27c. to 39c.	39c. to 51c.	51c. to 71c.	71c. and over	Total
Outside Employees	4002	286	19,193	515	24,086
Inside Employees	921	106	27,583	462	29,072
	5013	392	46,776	977	53,158

The great bulk of them—88 per cent—receive 51-75c. per hour. Of the 5,405 who receive less than 51c.—approximately 10 per cent—at least 4,133 are boys, including about 3,000 slate pickers who work in the breaker above ground, and about 800 door boys underground who open and close the doors of the haulageways. Of the adult employees, therefore, approximately 95 per cent receive hourly rates between 51 and 71c. per hour. As most of these employees are on an eight-hour day, their daily rate is $4.08-$5.68.

In further analysis of the rates of these 46,595 adult employees, they are subdivided in the following tables, first into ten groups and then into five:

TABLE VI—NUMBER OF ADULT ANTHRACITE MINE WORKERS RECEIVING CERTAIN SPECIFIED RATES PER HOUR

	51c. to 53c.	53c. to 55c.	55c. to 57c.	57c. to 59c.	59c. to 61c.	61c. to 63c.
Outside	8597	1752	1770	990	1875	996
Inside	307	823	2418	1751	5394	7498
Total	8904	2575	4188	2741	7269	8494

	63c. to 65c.	65c. to 67c.	67c. to 69c.	69c. to 71c.	Total
Outside	736	1069	1044	297	19126
Inside	2134	2560	3478	1106	27469
Total	2870	3629	4522	1403	46595

	51c. to 55c.	55c. to 59c.	59c. to 63c.	63c. to 67c.	67c. to 71c.
Outside	10349	2760	2871	1805	1341
Inside	1130	4169	12892	4694	4584
Total	11479	6929	15763	6499	5925

To summarize: 24 per cent of the adult employees paid by the hour receive 51-54c. per hour; 15 per cent, 55-58c. per hour; 34 per cent 59-62c. per hour, and 13 per cent, 67-71c. per hour.

The appendix shows rates by specified occupations in considerable detail. The above figures have grouped employees together regardless of occupation, merely for the purpose of showing the opportunity for earning afforded by the anthracite industry irrespective of the particular name by which a worker's occupation may be called. Many of the occupations are peculiar to mining and no valuable purpose would be accomplished by enumerating them here. But for purposes of comparison it may be well to refer to some of the occupations that are found in outside industries as well as in anthracite mines.

For 101 blacksmiths working underground, for example, the rates range from 61 to 81c. per hour, 70 per cent falling between 65 and 69c. Of 448 blacksmiths working above ground, 258 received from 65 to 69c. Of 67 carpenters working underground, 50 received from 67 to 71c., of 1,762 carpenters working above ground, 86 received from 51 to 59c., 314 from 59 to 63c., 634 from 63 to 67c., 609 from 67 to 71c., and the remainder, 71c. and over. Of 126 electricians working underground 57 received under 63c. per hour, and 69 over that rate. Of 110 electricians working outside, 11 received under 59c. per hour, 83 between 60 and 71c., and the remaining 16, 71c. and over. Of 1,861 firemen, 117 received less than 57c. per hour, 1,394 from 57 to 61c. an hour, 289 from 61 to

65c. an hour, and the remaining 61, 65c. an hour and over. Of 628 outside machinists, 35 received less than 55c. an hour, 129 from 55 to 59c., 149 from 59 to 63c., 158 from 63 to 67c., 113 from 67 to 71c., 20 from 71 to 75c., while the remaining 24 received 75c. and over. Of 2,530 men classified as laborers working underground, 28 received less than 51c. per hour, 96 from 51 to 55c., 343 from 55 to 69c., 1,914 from 59 to 63c., 130 from 63 to 67c., 19 from 67 to 71c. Of 4,001 outside laborers, 26 received less than 51c., 3,801 received between 51 and 55c., 135 between 55 and 59c., 39 received 59c. and over.

To show the actual rates being paid to certain representative groups of employees as well as the change in these rates from 1903 to the present time, tables are given below for outside laborers and for company miners at different collieries. The first two columns give the actual hourly rates paid April 1, 1903, and 1923. Thus in the first table, covering outside laborers, the hourly rate fixed by the award of the commission in colliery No. 1 was 16½c. per hour. The various increases granted by the successive agreements have brought this up to the present rate of 52½c. per hour. The second set of columns show relative rates, on the base of the rate fixed in 1903. Thus, if we take the rate of outside labor shown for colliery No. 1 as being the equivalent of 100 on April 1, 1902, the rate under the agreement of 1912 was equivalent to 110 and the present rate to 318, indicating a total increase of 218 per cent.

TALBE VII—RELATIVE RATES OF PAY FOR OUTSIDE LABORERS (a) IN THE ANTHRACITE FIELD, 1903, 1912, 1923 (1903—100)

No. of Operation	Hourly Rates April 1, 1903	Hourly Rates April 1, 1923	Relative Rates April 1, 1903	Relative Rates May 20, 1912	Relative Rates April 1, 1923
1	.165	.525	100	110	318
2	.170	.525	100	110	309
	.180	.532	100	110	296
4	.150	.381	100	110	254
5	.160	.525	100	110	328
9	.160	.381	100	103	238
	.170	.525	100	110	309
	.180	.532	100	110	296
	.200	.562	100	110	281
23	.171	.525	100	110	307
	.183	.536	100	110	293
42	.130	.525	100	110	404
	.143	.525	100	110	367
62	.178	.532	100	111	299
64	.163	.525	100	110	322

(a) Stripping operation laborers not included.

TABLE VIII—RELATIVE RATES OF PAY FOR COMPANY MINERS IN THE ANTHRACITE FIELD, 1903, 1912, 1923 (1903—100)

No. of Operation	Hourly Rates April 1, 1903	Hourly Rates April 1, 1923	Relative Rates April 1, 1903	Relative Rates May 20, 1912	Relative Rates April 1, 1923
1	.235	.643	100	110	274
2	.235	.643	100	110	274
10	.245	.658	100	110	269
11	.230	.636	100	110	277
23	.266	.689	100	110	259
28	.222	.664	100	113	299
42	.252	.668	100	110	265
58	.258	.678	100	110	263
64	.244	.656	100	110	269

While it is not practicable to show the *actual* rates paid contract miners because of the wide variety in these rates and of the differing bases on which they rest in different collieries, a table is appended showing the *relative* rates of contract miners. The rates of 1902 are taken as 100. The increases granted by the various awards are then applied to this basis up to and including the agreement now in effect. The various agreements have made the relative rate of 1923 213.6 as compared with base rate of 100 in 1902.

TABLE IX—RELATIVE WAGE RATES OF ANTHRACITE CONTRACT MINERS*

(April 1, 1902—100)

1902	100.0	1914	121.0
1903	114.4	1915	121.0
1904	114.8	1916	129.5
1905	114.3	May, 1917	142.5
1906	114.9	December, 1917	161.9
1907	114.2	November, 1918	181.3
1908	114.4	1919	181.3
1909	114.5	November, 1920	213.6
1910	114.4	1921	213.6
1911	115.0	1922	213.6
1912	121.0	1923	213.6
1913	121.0		

*Relative numbers for years 1903 to 1911 inclusive are based on the increase granted by the Award and the average annual increases resulting from the operation of the sliding scale.

Opportunities for Employment in Anthracite Mines.—The improvement in the economic condition of the anthracite mine worker is not fully reflected by the increases in contract and wage rates. A further and much more important increase in his earning power is due to the increased opportunities afforded him to work. The following table shows the average days worked by anthracite mines from 1890 to 1921, both years included.

As concerns regularity of employment, the condition in the anthracite industry from 1890 to 1903 was very similar to the present demoralized conditions in the bituminous field. Only twice in those fourteen years—and those were the first two years of this period—did the number of working days average as many as 200. After 1891 the average went down, until in 1897 it was only 150, less than half the full working year, and it did not reach 200 again until 1903.

TABLE X—AVERAGE DAYS WORKED BY ANTHRACITE MINES 1890—1921

(Based on statistics of the U. S. Geological Survey)

Year	Days worked	Year	Days worked	Year	Days worked	Year	Days worked
1890	200	1900	166	1910	229	1920	271
1891	203	1901	196	1911	246	1921	271
1892	198	1902	(a) 116	1912	231		
1893	197	1903	206	1913	257		
1894	190	1904	200	1914	245		
1895	196	1905	215	1915	230		
1896	174	1906	195	1916	253		
1897	150	1907	220	1917	285		
1898	152	1908	200	1918	293		
1899	173	1909	(b)	1919	266		
Average	183	Average	190	Average	254		

(a) Strike (b) Not available.

Dividing the table into five periods beginning with 1901, we find that in the first period the average was 197 days, or less than two-thirds of a full year; in the second, ending in 1900, only 163 days, little over half a year. In the next period although this included the strike of several months in 1902, it was 186 days; and in the period ending 1910, with figures for one year missing, 211. In the next period ending 1915, it rose to 248 days, and for the six years ending with 1921 it was 273, approximately 90 per cent of a full working year. The average number of days for all the mines in 1921 was 271 days; and approximately 40 per cent of the employees worked in mines that operated 290 days or over.

The following table shows the percentage of employees who had opportunity to work a specified number of days in the year 1921:

TABLE XI—PER CENT OF ANTHRACITE EMPLOYEES IN COLLIERIES OR WASHERIES WHICH WORKED EACH SPECIFIED NUMBER OF FULL-TIME DAYS IN 1921.

(Based on operator's annual reports to the U. S. Geological Survey)

Days worked by colliery or washery	Cumulative Per cent of all Anthracite employees	Days worked by colliery or washery	Cumulative Per cent of all Anthracite employees
300	6.1	200 or over	94.6
290 or over	40.3	180 or over	95.9
280 or over	59.4	160 or over	96.2
270 or over	67.3	140 or over	97.2
260 or over	76.8	120 or over	97.5
250 or over	87.5	100 or over	98.0
240 or over	90.4	80 or over	98.0
230 or over	91.9	60 or over	98.4
220 or over	92.6	40 or over	(a) 100.0
210 or over	93.1		

(a) The number employed on operations working less than 40 days was only 28, or one-sixteenth of one per cent.

TABLE XII—CLASSIFICATION OF EARNINGS FOR CONTRACT AND CONSIDERATION MINERS SHOWING AVERAGE STARTS PER MAN AND NUMBER OF MEN FOR THE ANTHRACITE INDUSTRY IN 1921

Earnings	Average Starts per Man	Number of Men
Under $100	8	9162
$100 and under 200	26	4563
200 and under 300	41	3605
300 and under 400	55	3070
400 and under 500	70	2560
500 and under 600	83	2648
600 and under 700	94	2495
700 and under 800	106	2002
800 and under 900	121	1760
900 and under 1000	138	1535
1000 and under 1100	154	1351
1100 and under 1200	172	1415
1200 and under 1300	189	1425
1300 and under 1400	204	1534
1400 and under 1500	217	1763
1500 and under 1600	231	1928
1600 and under 1700	238	2136
1700 and under 1800	246	2362
1800 and under 1900	249	2379
1900 and under 2000	254	2353
2000 and under 2100	257	2253
2100 and under 2200	259	1903
2200 and under 2300	261	1719
2300 and under 2400	263	1331
2400 and under 2500	265	1199
2500 and under 2600	266	856
2600 and under 2700	268	633
2700 and under 2800	271	524
2800 and under 2900	272	394
2900 and under 3000	272	282
3000 and under 3100	271	226
3100 and under 3200	271	185
3200 and under 3300	272	155
3300 and under 3400	276	103
3400 and under 3500	279	99
3500 and under 3600	281	72
3600 and under 3700	287	52
3700 and under 3800	280	39
3800 and under 3900	276	22
3900 and under 4000	297	23
Over 4000	288	163
		64,279

Earnings of Anthracite Mine Workers Classified by Main Occupations

Earnings.—In the preceding pages the *rates* of wages for employees paid by the day or the hour have been given in considerable detail. When an hourly rate is given it is possible to compute what can be earned in a day of given length and to compare the rate with rates for the same occupation in other collieries or in other industries. It is not practicable to give a similar statement of *rates* for contract miners. They vary widely, not only between different collieries but also between different sections of the same colliery, as they are determined by the varying conditions in the veins in which miners are working. The base upon which the rate is fixed varies also, in some instances being by the ton, in others by the car, and in still other instances by the year. Moreover, in one colliery the rate per ton or per car may include setting props and doing other deadwork while in another there may be specific rates for different classes of dead work in addition to the rate per car. It, therefore, seems useless to undertake to give rates for tonnage workers.

Reports showing earnings were secured from 216 of the 254 operations in the anthracite region that employed 75 men or over during the year 1921; all the operations in the Lehigh district, 100 out of the 128 in the Wyoming, and 83 out of the 96 in the Schuylkill district. These reports show the name of every employee appearing upon any payroll during the calendar year 1921: the earnings for each one and the number of days on which he started work. The tables which follow classify the men according to the amount of their earnings and show also the average number of the men in each earning group.

Obviously tables made up on this basis do not give the total earnings for the year of many of the employees included. For example, if a man worked ten days in colliery A, six weeks in colliery B, and ten months in colliery C, he would be reported by all three collieries and would appear as three units in the table, but no one of the three reports would represent his total earnings for the year. It would not be practicable to follow each mine worker from colliery to colliery to secure his total annual earnings.

The total number of men reported in the table is of course in excess of the number required to fill the positions, since one individual may be reported from two or more collieries. In the detailed tables published in the appendix the employees in each of the earning groups are shown under the colliery in which they worked, and the collieries are grouped according to the number of days they operated. From these detailed tables a fair idea may be derived of the annual earnings of those who work approximately through the year. From the summary tables it is possible to derive an approximate idea of the possibility of earnings by those employees who work a full year.

One way to avoid some of the difficulties that are inherent in the method that has been adopted would be to report the earnings of only those employees who work throughout the entire year. But this would make an inaccurate showing. A considerable number of employees lose some time during the year through illness, accident, shutdown, bad condition of working places, or other causes beyond their control. Frequently when a contract miner finishes driving his working place it may be some time before he secures another place to work. To give the earnings, therefore, only of those who work for the full year would eliminate all loss of earnings which were beyond the mine workers' control, would reflect only the cream of the earnings, and would give an exaggerated idea of the earnings of mine workers under the actual conditions of their every day life.

It was deemed preferable, therefore, by the Commission to tabulate all names on the payrolls, since whatever defects there may be in this method are obvious and can be taken into account in studying the tables; and a corrective appears on the face of the tables by the figures showing the average number of starts made by the men in each group. The table on page 49 shows by classified groups the earnings reported for 64,279 names of contract and consideration miners.

As has been stated, this does not represent 64,279 separate miners, since the same man may be included more than once. The very large proportion of men given in the lower wage groups indicates a large amount of "turnover" in the mines, a subject which is considered more fully in a succeeding section of this report. Over 9,000 men are shown as earning under $100 and has having worked an average of only eight days. This means that many men appeared on the payrolls of different mines and earned less than $100 in each of these mines. The table also shows that this group made on the average only eight starts in the mines on whose payrolls they appear. Similarly, 4,563 are shown as earning between $100 and $200, and as having worked on the average only 26 starts.

The average starts made by all the anthracite mines during the year 1921 was 271 days, some mines having started more than this number of days and some less. The earnings, therefore, in the upper wage classifications where the average number of starts was above 250, may be taken as approximating toward the annual earnings in these groups, and this may be true in the groups immediately below 250. The fact that over 9,000 men appear on the various payrolls as having earned under $100 in individual mines and as having worked on the average in these mines only eight days, shows that a very large number were going from mine to mine, seeking better opportunities for earning, and through this shifting must have lost no inconsiderable amount of working time.

A comparison of the average starts made by the men in each of the wage groups with the earnings classification gives an approximate idea of the earnings per start made by the different groups shown in the table though the average earnings per start cannot be computed with exactness; one of the significant things disclosed is the increasing

TABLE XIII—CLASSIFICATION OF EARNINGS FOR CONTRACT AND CONSIDERATION MINERS' LABORERS SHOWING AVERAGE STARTS PER MAN AND NUMBER OF MEN FOR THE ANTHRACITE INDUSTRY IN 1921.

Earnings	Average Days Per Man	Number of Men
Under $100	7	33679
$100 and under 200	27	11625
200 and under 300	45	7014
300 and under 400	63	4618
400 and under 500	80	3542
500 and under 600	97	2624
600 and under 700	115	1865
700 and under 800	133	1525
800 and under 900	151	1243
900 and under 1000	167	1160
1000 and under 1100	185	1031
1100 and under 1200	202	980
1200 and under 1300	222	1036
1300 and under 1400	239	1037
1400 and under 1500	252	920
1500 and under 1600	256	710
1600 and under 1700	262	539
1700 and under 1800	261	297
1800 and under 1900	260	190
1900 and under 2000	265	135
2000 and under 2100	268	93
2100 and under 2200	276	55
2200 and under 2300	290	34
2300 and under 2400	280	28
2400 and under 2500	327	16
2500 and under 2600	295	10
2600 and under 2700	293	5
2700 and under 2800	260	1
2800 and under 2900	274	1
2900 and under 3000	332	3
		76,016

average wage per start as the earnings groups ascend. In the $1,500 to $1,600 group, the average earnings per start approximate $6.75 and they rise until the average in the $2,500 to $2,600 group is around $9.50; and in the $3,000 to $3,100 group it would go above $11. This steady increase of average earnings per start, with the increasing earnings classes, represent the more skilled miners, or possibly those working in exceptionally favorable places.

The next table gives the earnings of miners' laborers in the same form as the earnings for miners were shown. This table indicates even more strikingly than the one for miners a tremendous shift from one place to another. Over 33,000 miners' laborers are shown as having earned under $100 in the individual collieries on whose payrolls they appear and as having averaged only seven starts per man. The miner's laborer is the employee of the miner rather than of the company, and the large turnover indicated here shows that the laborers were moving around at an astonishing rate. This condition is more fully reflected in the later section of this report dealing with turnover.

The table given below shows the earnings of outside company men, that is, men paid by the day or the hour, whose place of work is outside the mine and above ground. The first glance at this table shows a marked contrast in steadiness of employment between the outside day men and the inside men. It has been shown in a previous section of this report, dealing with hourly rates, that for similar occupations inside men have slightly higher rates than those outside. The same fact is reflected in this table by the number of outside men who may be considered as working approximately a full year. The earnings of the outside men who may be considered as having worked to the full extent of their opportunity ranges from $1,100 to $1,700. Therefore, with the exception of some ten men, all of the groups of these outside day men shown as earning $1,700 averaged more than 365 days. As in the case of inside men, the earning of those working over 365 days represent men working more than an eight-hour day, and the earnings, therefore, represent over-time as well as the earnings of a normal day:

TABLE XIV—CLASSIFICATION OF EARNINGS FOR OUTSIDE MEN FOR THE ANTHRACITE INDUSTRY IN 1921.

Earnings	Average Starts per Man	Number of Men
Under $100	10	5006
$100 and under 200	35	3286
200 and under 300	58	2907
300 and under 400	81	2153
400 and under 500	105	1990
500 and under 600	128	1816
600 and under 700	152	1440
700 and under 800	177	1279
800 and under 900	207	1288
900 and under 1000	228	1330
1000 and under 1100	251	1929
1100 and under 1200	272	2638
1200 and under 1300	291	2804
1300 and under 1400	309	2401
1400 and under 1500	327	2347
1500 and under 1600	346	2258
1600 and under 1700	363	2141
1700 and under 1800	373	2149
1800 and under 1900	383	1569
1900 and under 2000	396	1091
2000 and under 2100	407	709
2100 and under 2200	408	543
2200 and under 2300	433	276
2300 and under 2400	444	151
2400 and under 2500	453	80
2500 and under 2600	452	42
2600 and under 2700	464	27
2700 and under 2800	459	14
2800 and under 2900	470	6
2900 and under 3000	444	2
3000 and under 3100	...	....
3100 and under 3200	395	1
3200 and under 3300	326	1
3300 and under 3400	...	....
3400 and under 3500	...	....
3500 and under 3600	292	1
3600 and under 3700	...	....
3700 and under 3800	...	....
3800 and under 3900	308	1
3900 and under 4000	...	....
4000 and over	380	2
		45,678

Labor Turnover and Overtime Employment

Turnover.—A study of turnover in anthracite mines has been made from reports from 127 mines and ten washeries located in the three fields and representing 40 per cent of the total production. By turnover is meant the changes in personnel due to men leaving the employment and others being hired to take their place. The extent of turnover is expressed in a percentage. If there are 100 positions and only 10 changes in personnel during the year the rate of turnover is 10 per cent. If 50 men leave and 50 are hired in their places, the rate of turnover is 50 per cent. If changes go on so rapidly that 125 men are hired to fill the places of men leaving, the rate of turnover is 125 per cent.

The variations in turnover in the 127 operations studied are so wide as to make any average useless. The variations occur not only between the different regions but also between different mines and between different occupations in the same mines. The tables given in the appendix classify the mines by the number of employees, showing on a percentage basis all separations from the payroll that occurred in the year 1921; the number of complete separations, that is employees who did not return during the year; the number who left but were re-employed; the number of new men hired, and the percentage of the normal force that remained at work continuously throughout the year.

Mine workers in their status as employees, are divided into two general classes: (1) Those who are employed directly by the companies, and (2) the laborers who work with the contract miners as their helpers, and are employed and discharged directly by the miner.

This distinction is important in studying figures of turnover, since the management of a colliery has no control over the extent of turnover that may occur among miners' laborers, and there is a tremendous difference between the company employees and the miners' own employees in this respect. In one colliery, with a percentage of turnover among company employees of only 39 per cent, which is comparatively low, the turnover of contract miners' laborers was 263 per cent. In another colliery, with a turnover of 68 per cent for all classes of company employees, the turnover rate for contract miners' laborers was 416 per cent.

The wide range in turnover rate both among collieries and among groups of employees is illustrated by figures for the Lehigh region. In the collieries reporting from that region the turnover ranges from 8 per cent to 114 per cent for contract miners; from 11 per cent to 156 per cent for inside day men; from 14 per cent to 52 per cent for outside day men; and from 60 per cent to 416 per cent for contract miners' laborers. Comparing the three regions into which the anthracite fields are divided for all classes of company employees, the turnover ranges in the Lehigh district from 21 per cent to 83 per cent; in the Wyoming region from 8 per cent to 255 per cent, with an even higher percentage at one washery, and in the Schuylkill region from 29 per cent to 194 per cent.

Although in many instances the turnover is above 100 per cent, this of course does not mean that every employee of the colliery left during the year and that there was a consequent change of personnel in every single position. On the contrary, in practically all cases the turnover is limited to a certain percentage of the positions; for example, in a force of 100 employees, 80 of them might remain in their positions without change during the year while the remaining 20 positions might each be filled five different times during the year. This would establish a turnover of 100 per cent, although 80 per cent of the working force was not affected and the plant might be considered as having a more than ordinarily stable force. The tables all indicate the percentage of the total force involved in the turnover by showing in each case the percentage of men who remained at work continuously throughout the year.

In the study of earnings attention is called to the very large number of men who appeared on the payrolls as working less than two weeks. These figures should be taken into account in connection with the study of turnover. In other parts of the report references are made

to the very wide variety of conditions not only between the different mines but in different parts of the same mine and even in different parts of the same vein. Attention also has been drawn to the wide variety from colliery to colliery in the range of rates paid in the different occupations of day men.

When a new contract miner comes to work in a colliery he may find that the better working places are filled. If he is not satisfied with the working place assigned to him, he is likely to quit and go on to another colliery hoping to better himself. He may repeat this attempt over and over, thus becoming a factor in the turnover rate of one colliery after another. In the same way, day men, knowing of better opportunities in another colliery, leave their positions when they hear of a vacancy at a better rate elsewhere. Ordinarily the turnover reflects the demand for labor. When jobs are scarce men do not readily give up a position to seek another, and the turnover at such a time is low. On the other hand, when labor is scarce, when there are more jobs than there are men and when jobs are beckoning from every side, the natural instinct of a man to better his position will reflect itself in an increased turnover.

The output of anthracite coal in the year 1921 was greater than it was in either 1919 or 1920. It was not so large as in 1917 and 1918, but with the exception of these two years it was higher in 1921 than in any year since 1914. It is probable, therefore, that the turnover shown in 1921 may be somewhat above the average. The median turnover point in the three regions—that is the middle percentage for both turnover and stability—is as follows:

	Turnover, per Cent	Stability of Force, per Cent
Lehigh region	55	71
Wyoming region	100	58
Schuylkill region	115	54

These figures mean that in the Lehigh region, for example, the 71 men out of each 100 in the working force remained in the employment of the same company throughout the year, while 29 positions out of each 100 had to be refilled more than once during the year, 55 men being required to fill these 29 positions. In both of the other regions turnover was considerably higher and stability considerably lower.

While the turnover in these collieries seem high, and is high absolutely, it is not so relatively. A study of labor turnover in 157 industrial concerns made by Brissenden and Frankel shows a turnover of approximately 115 per cent for the year 1913-14; for the year 1917-18, under war-time conditions, approximately 180 per cent. A study of eleven firms in Philadelphia for the year 1921 made by the Industrial Department of the Wharton School of the University of Pennsylvania shows a labor turnover ranging from 22 per cent to 183 per cent with the median point at about 66 per cent.

Excessive Hours.—While a general eight-hour day was established by the agreement of 1916, there are still a considerable number of employees working nine or more hours per day. A report covering fifty-five specified occupations was secured to develop the number of employees in these occupations working nine hours or over. The following table gives the returns received from this query. Some companies, but not all, reported occupations in addition to the fifty-five included in the questionnaire, and these have been grouped under miscellaneous. As most of the companies reported on the classes covered in the questionnaire and as reports from a few of the companies show other occupations having a day of nine hours or more, the figures given in this table probably would show less than the total number of men actually working nine hours or more in the 148 collieries reported.

In the face of the principle of the eight-hour day properly accepted in successive agreements since 1916, there can be no justification for the employment of a considerable number of men on shifts of twelve hours or more.

TABLE XV—ANALYSIS BY OCCUPATIONS OF THE 907 EMPLOYEES WORKING OVER EIGHT HOURS IN THE ANTHRACITE INDUSTRY APRIL, 1923*

	Length of Working Day in Hours										Total Number Of Men
	9	9½	10	11	11½	12	12½	13	13½	14	
Ashmen	8	..	6	18	...	17	...	..	...	..	49
Carpenters	1	..	..	..	...	...	...	..	...	..	1
Chute bosses	1	..	..	..	...	...	...	..	...	..	1
Electricians	7	..	..	..	...	...	...	..	...	..	7
Electricians' helpers	4	..	..	..	...	...	...	..	...	..	4
Engineers, breaker	3	..	..	..	...	1	...	..	...	..	4
Engineers, locomotive (motormen)	44	..	1	..	...	...	...	..	...	..	45
Engineers, plane	14	..	4	..	...	...	...	..	...	..	18
Engineers, power house	1	..	..	..	...	83	...	..	...	..	84
Engineers, shaft	5	..	..	..	...	...	...	..	...	..	5
Engineers, slope	26	..	..	..	...	7	...	..	...	..	33
Firemen	2	..	..	..	...	17	...	..	...	..	19
Firemen's helpers	...	..	..	..	...	6	...	..	...	..	6
Footmen	2	..	1	..	...	1	...	..	...	..	4
Headmen	...	1	..	..	...	4	...	..	...	..	5
Jig runners	1	..	..	..	...	...	...	..	...	..	1
Machinists	4	..	..	..	...	...	...	..	...	..	4
Oilers (men)	1	..	..	..	1	...	...	..	...	..	2
Pumpmen	5	..	5	..	...	28	...	..	...	..	38
Stablemen	12	..	18	34	...	110	...	12	...	1	187
Stablemen's helpers	...	..	1	..	...	7	...	..	...	..	8
Watchmen	7	..	14	3	...	201	1	21	2	28	277
Miscellaneous (1)	7	..	7	3	...	88	...	..	...	..	105
Totals	158	1	57	58	1	570	1	33	2	29	907

* Information regarding the length of the basis working day was supplied to the Commission by 148 collieries covering the employees in 54 occupations and their subdivisions. The total number of wage earners reported was 44,003.

(1) Includes all the inside and outside employees not otherwise classified for whom the length of the basic working day was specified.

Hazards.—Although the act establishing this commission does not specifically mention mine accidents among the subjects to be investigated, the Commission cannot refrain from calling attention to the hazards to life and limb in the anthracite-mining industry and to the need for reviving and intensifying interest in safety precautions. Notwithstanding the striking absence of great disasters, such as occur in bituminous coal mines from dust explosions, the daily toll of the lives of miners and miners' helpers from falls of coal and slate and from gas and powder explosions in the working places carries the aggregate of fatalities to a higher rate than prevails among bituminous miners in the same state in which the anthracite mines are located. The thick pitching seams of many of the anthracite mines make for special dangers from falls and from accumulations of explosive gas. Generally, on account of the harder nature of the coal, more explosives are used. Accidents in haulageways and on the surface follow in importance those caused by falls and explosives. After 1916, when workmen's compensation insurance became effective in Pennsylvania, there was some decrease in underground fatalities.

There is no positive evidence that the anthracite miners suffer from special occupational disease. In other words, if accidents can be reduced the average anthracite miner would apparently have a normal expectation of life.

Firebosses and section foremen hold the key to the company side of underground safety; but the active participation of miners in any safety-first campaign is essential. The education and training of miner and mine official in the prevention of hazards have a moral as well as a practical value. A safety committee in every colliery, composed of officials and miners, would be helpful. A pooling of experience and ideas among the different mines of each company and among the companies operating in a district under similar conditions would be desirable. The lesson in prevention which every injury or death might teach if the industry were organized to profit by them should not have to be taught repeatedly by further preventable injuries and deaths.

Safer conditions will not come in a day, as the result of any startling innovations, but rather through long-continued effort on the part of miners' organizations, safety committees, night schools, mining institutes, company officials' meetings, state and federal agencies, all working together and aided by a strong moral support from miners and operators alike. Safety should be a common meeting ground of operators and miners working to a common end through training, education and habitual exchange of ideas and practices.

At the same time the importance of legislative protection and reasonable and well-administered compensation for injuries cannot be overlooked. It is greatly to the credit of the miners' organizations in the anthracite field that they originated and secured in 1869 the passage of the first act in the United States for the state inspection of mines. In the past twelve years the state anthracite law has had little or no revision, efforts in this direction having been defeated by lack of agreement between operators and miners. During this time electricity has been extensively introduced into mining and has brought its new hazards. The anthracite law still has no electrical code in contrast with the bituminous law, which has an elaborate electrical section.

Under the accident compensation law of Pennsylvania practically all of the larger mining companies elect to carry their own risks. The state insurance fund and the commercial insurance companies in which the smaller mine companies are insured maintain a compensation rating and inspection bureau. The insurance rate for a particular mine is based on the degree of adherence to safety standards by the mine in question and on its actual accident experience. This creates an economic motive for safety. Unless this motive and an ordinary decent respect for human life gradually become more effective in making the mines safe for miners there will inevitably arise the question as to whether more drastic legislative interference may not be necessary even if this would mean less coal mined per man and at a higher cost.

The Commission will submit as an annex a brief special report on safety in anthracite mining.

Living Conditions.—Whether the earnings and working conditions are such as to enable the anthracite mine workers and their families to maintain a decent and satisfactory—what is frequently called an American—standard of living is one of the questions on which the Commission has sought information both by personal visits of members in the region and by painstaking investigation of field agents.

The anthracite miners are not, like some of the bituminous miners, a segregated population. They do not live in isolated communities cut off by mountains or by distance from easy communication with others. They are an integral part of the Commonwealth of Pennsylvania, sharing the benefits of the school system, churches, courts of justice, street railways, highroads and other public and voluntary local insti-

tutions. At the same time they constitute so large a part of the population of the five counties, and the mines, directly or indirectly, furnish the means of livelihood to so large a proportion of the residents, that it is fair to speak with qualifications of Scranton, Pittston, Wilkes-Barre, Hazleton, Shamokin, Shenandoah, and Pottsville, as well as the smaller towns and villages, as predominantly anthracite communities.

Their churches, charities, lodges, schools, roads, home life and leisure-time activities are all greatly influenced by the dominating occupations of the men. The great culm piles, the towering breakers sometimes, where modern wet processes of preparation have not been introduced, with black dust rising from them like smoke, the discolored streams carrying black silt, and the broken surface of roads, building lots and fields from subsidence and caving, obvious as all these are to the casual traveller, are, to the trained observer, not more evident than are the effects of the anthracite industry as a whole on the family and community life of the mine workers.

The miner himself works often far underground, exposed constantly to various kinds of physical danger, under conditions not permitting the factory kind of close supervision. He is likely to be controlled in an exceptional degree by local traditions, practices and prejudices, justly proud of his skill and jealous of his rights. He is familiar with rough and ready methods of settling personal differences; and because of diverse national and racial origins he suffers from factional and partisan divisions, which are no doubt less in evidence now than formerly, but are still a disturbing factor both in industrial and in social relations.

The miner's work is severe while it lasts and it influences the character of the recreation and amusements which he seeks when he is free from it.

The domestic life of the mining population has of course all the lights and shadows of any large number of families. It is no longer a submerged or exploited population, whatever may have been true of the period before 1900, when the series of wage increases described elsewhere in this report began. The earnings of full-time workers set forth in the tables of the appendix certainly permit the essentials of a reasonable standard of living. Those who take full advantage of their opportunities to earn in the various occupations connected with the industry and are not handicapped by serious misfortune need not suffer for shelter, food, clothing or other decencies and comforts of life, even without supplementary earnings of wife or children.

On the other hand, many of the families of the miners' helpers or laborers have a very uncertain and inadequate income. These families, often large, are frequently in economic distress. District nurses and social workers are frequent callers at their homes. The scarcity of labor, which the Commission has elsewhere called the limiting factor at the present time in the production of anthracite is precisely in this class of labor. The connection is obvious between the irregular and low earnings and the supply. The industry and the public are especially interested in this aspect of the wage problem for the reason that miners' helpers are the only ones who can get the experience and training to become qualified and certificated miners, and if their wages and conditions of employment are not such as to recruit the right type of men, the future supply of miners is unfavorably affected at its very source.

Operators and unions have the remedy in their own hands. Some adjustment of wages and of the terms of employment which will bring larger and more assured incomes to these laborers is the first step in increasing their number and efficiency. To increase production is not the only or main reason for this readjustment, but if it has that effect consumers of anthracite will have no reason to complain.

The impression which a fair-minded and sympathetic observer in the anthracite region will gain is of drab and bleak exterior conditions, imposed not by lack of earnings or incomes but by the very character of the industry. The communities are not without electric lights, water supply and sewer systems, or churches, schools, libraries and playgrounds, although a considerable part of the population are less supplied with such facilities of community life than is desirable and less than the prosperity of the industry as a whole would permit, if public spirit and civic responsibility were aroused and directed toward supplying the deficiencies. Detailed information on these subjects will be found in the appendix on living conditions and cost of living.

Sanitary Conditions.—For 19 sample communities of the 116 in which the anthracite miners live, a comparative rating of sanitary conditions has been secured from the U. S. Public Health Service together with definite suggestions for improvements based upon special studies made at the request of the Commission. The 19 communities selected for this purpose include one of the two larger cities (Wilkes-Barre), 8 small company-owned settlements with an average population of 530, and 10 towns with population ranging from 1,080 to 28,000.

The combined sanitary ratings—based on weighted estimates of water supply, sewerage, sanitary control, activities for the prevention of disease, and environment and habits of the population—range from 80.8 out of a possible 100 points in Wilkes-Barre, down to 21 in a company-owned town of about 500 population. Only six of the 19 have ratings above 60—four with a population of over 7,000 and two small company-owned places of less than 400. In general the larger places show an advantage over the smaller in this matter of sanitation, which does not often receive much consideration from the miner, as well as in the educational, social and economic facilities, of which he is more conscious. The average total rating for the eleven larger places is 58.8; for the eight smaller, 49.7. The average weighted mean, taking into account the factor of population, is 67.9 and 49.2 respectively.

Good water is available in most of the communities, and credit for this is assigned chiefly to the natural advantages of the district and to the fact that water is essential to the operations of the collieries. If it were not for the relatively high ratings which could be given for this point, the general ratings of sanitary status would be even lower than they are. Except in five or six places, the sewerage ratings are low. Even where sanitary sewers are available, the majority of the houses are not connected. Privies of poor construction, rarely cleaned and more rarely inspected, are the rule.

With few exceptions, very little is done to insure purity in the milk supply, to protect foodstuffs from contamination, or to keep down the number of flies. Heaps of manure within a few feet of dwellings; garbage and other refuse awaiting collection for days in open boxes, barrels, or tubs; swarms of flies and clouds of dust; meat, bread, fruit and vegetables exposed for sale not only in unscreened groceries but unprotected on hucksters' wagons in the streets; lack of competent supervision of milk, and prevalence of the "one-cow dairy," are conditions which contribute to the low ratings on these points.

Only four of the 19 communities have full-time health officers, and seven have no semblance of organized public health work. Medical inspection of school children is general and in many places there are nurses attached to the mining companies, the Red Cross, the Metropolitan Life Insurance Co., the State Department of Health, or a local society, but for the most part their efforts are uncorrelated and scattered, and hence less effective than they should be.

These facts should awaken a sense of serious responsibility on the part of public officials and citizens.

The exceptions to the general statements given above, the differences between the individual communities, and much more material of interest and value, will be found in the report of the Public Health Service which is presented as an appendix.

Economic History of the Anthracite Industry

Anthracite a Natural Monopoly. — The basis for the Commission's recommendation that mining and marketing of anthracite shall henceforth be regarded as affected by a public interest rather than left to the unqualified and uncontrolled operation of the laws of supply and demand under free competition is the fact that there is and can be no such free competition because the supply is limited and controlled. The conditions are wholly unlike those under which wheat, for example, is produced.

Four facts stand out. Nature has given to eastern Pennsylvania a practical monopoly of anthracite, the only other producing region worth noticing being Wales, where a few million tons are mined each year, the greater part of it for export to the Continent. The underground reserves of Pennsylvania anthracite are less than fifteen billion tons, about two-thirds of the original deposits. The coal lands are owned by a small number of corporations, estates and individuals, who seldom offer even small tracts for sale and who enjoy the full unearned increment caused by increasing demand and by differential advantages. Ninety per cent or more

of the unmined coal is controlled by eight coal companies and affiliated corporations. There is a unified control of mine labor, the entire region being for practical purposes 100 per cent organized for collective bargaining. For better or for worse the fact to be faced today is that wages, hours, and working conditions must be satisfactory to the workers.

Under such circumstances some of the operators who want peace at any price in order to continue their profitable operations fail to insist on exacting from the workers that honest day's work which in the long run is as much in the interest of the worker as it obviously is in the interests of the public. Together with the land and labor monopoly there is finally a concentration of coal mining in a small group of large companies.

It is this present control of the supply, an economic combination founded on a community of interest, which has brought the Commission to the conviction that the degree of public regulation which it has recommended in normal times and provision for prompt and effective action in an emergency are essential. A brief summary of historical facts will be useful to an understanding of the present situation.

Early History of Mining.—The eventful history of mining within the small area in which anthracite is produced embraces not much over one hundred years. In the first half of the nineteenth century the new fuel gave impetus to the building of canals and railroads, but later these "anthracite" roads sought and gained control of the coal lands, forming a combination of mining and transportation that has been declared illegal by the courts within the past fifteen years, although investigation of the effect of combination began under a legislative committee appointed just one hundred years ago.

The record of the annual output of the mines and the record of anthracite prices not only reflect the result of this contest for unified control but suggests its incentive. The early history of the industry was one of pioneer enterprise in the face of risks and discouragement, a typical American story of initiative, energy and courage. It is a story of discouraging pioneering and slow development of a market, followed by feverish and ruthless competition of carriers for an increasing traffic, peace in the coal business coming only through pools and agreements expressing community of railroad interests.

A number of competing railroad companies built lines to tap the region, and in the natural desire to obtain traffic, entered the business of mining and bought up what was left of the coal-bearing lands. In their haste to prevent other railroads from entering their territory, certain of these carriers bought recklessly and at what were then high prices, a vast speculative reserve of coal lands, an amount of coal in the ground that they could not hope to transport to market in less than scores, if not hundreds, of years. The industry was overdeveloped much as the bituminous industry is now. Overproduction and slack time were the rule. Prices were low, competition was expensive, and profits were small.

When the Anthracite Coal Strike Commission made its report 20 years ago, the industry was only just recovering from a six-year period of overproduction due to mine inflation, when the mine workers especially had shared in the serious losses in that they could be given employment for only 160 to 175 days in the year. It is significant that the commission attributed the betterment in the conditions in the anthracite industry in 1901 in part to "the gradual concentration of anthracite mining properties in the hands of fewer corporations."

Methods of Control—In order to stabilize the industry and to escape from the results of excessive competition, the railroads and their subsidiary mining companies resorted to pooling of traffic, limitation of output, and other devices. These devices to limit competition provoked much popular criticism and some of them have since been declared illegal by the Supreme Court of the United States. One of these devices existed fourteen years before it was finally overruled by the courts. It consisted in joint ownership by the several anthracite roads of the Temple Iron Co., upon whose board of directors were represented all the railroad interests of the region. In 1912 the Supreme Court held that the Temple Iron Co. was a combination in restraint of trade and ordered it dissolved. "It has been," said the Court, "an efficient agency for the collective activities of the defendant carriers for the purpose of restraining competition in the transportation and sale of coal in other states."

Another device was a marketing arrangement, the so-called percentage contracts, under which the railroad companies purchased the full output of the individual operators, paying eventually as much as 65 per cent of the average tidewater price, a percentage somewhat related to the high offers of projected competing lines. Orders under these contracts being apportioned according to colliery capacity, one result of the plan was to stimulate mine development without exerting any competitive influence on the market. This non-competitive marketing, which existed for 20 years, was finally terminated by the Court decree of 1912.

The principal and underlying method of limiting competition was the ownership of coal-mining and coal-selling companies by the railroads. The Hepburn Act, passed by Congress in 1906, largely with the relations of the anthracite carriers and their subsidiary mining companies in mind, prohibited a railroad from entering directly or indirectly into the production and sale of coal in competition with any shipper on its lines. Suits brought by the government in 1908 and later resulted in decisions of the Supreme Court directing the divorce of the coal and the railroad properties of three of the principal anthracite interests.

The degree of combination and its effect in competition as found by the Court in these latest cases is pertinent to the present investigation. Eight producing companies, affiliated to some extent with the railroads, produce 74 per cent of the total output and control 90 per cent of the underground reserve. The remaining 26 per cent of the output is contributed by so-called independent companies, but the largest of these companies retains a community of interest with one of the railroads, and nine others control 13 per cent of the output.

Until the decree of the Supreme Court went into effect the Reading and affiliated company, the Central of New Jersey, produced 20 per cent of the output and controlled more than half of the unmined reserve. Through these affiliations of railroads and mining companies the same financial interest controlled both the production and the transportation of coal, and commonly also its wholesale distribution, either through the selling department of the mining company or through a separately incorporated but financially related selling company.

Recent decrees of the Court have not been in effect long enough to develop whether by them the grievances have been eliminated and the industry brought to a competitive basis. The clause in the Pennsylvania Constitution that prohibits common carriers from mining and manufacturing articles for transportation over their lines, in effect Jan. 1, 1874, and the commodity clause of the Hepburn Act of 1906 did not create new and merely technical legal offenses. The practices which they prohibit are opposed to public interest as soon as common carriers are granted the privileges of eminent domain and exclusive franchise.

The Sherman Anti-Trust act is only the embodiment of recognized principles of common law. It was obvious to the owners of anthracite railroads as to others, long before the Hepburn and Sherman acts were passed or the Pennsylvania Constitution was amended, that a company which operated a railroad and also mined coal on its lines had an advantage over other coal-mining companies that were compelled to use the same railroad and that if the several railroads that enter the coal regions were to combine this advantage would become economically irresistible.

The economic position of the larger companies even since dissolution is stronger than that of the so-called "independents." Many of the mines of the independent companies are operated at high cost. Their average royalty rates are higher than those of the railroad coal companies. They have alleged, and the charge was confirmed by the decision of the Interstate Commerce Commission in 1915, that the companies affiliated with some of the railroads had in effect been subsidized by those roads either through cash advances or through remission of interest charges on loans already made to them.

The independents have been losing ground in the proportion of the total output produced, through absorption by the larger companies and through gradual exhaustion of their lands. In 1895 the independents produced 45 per cent of the tonnage; in 1900, 38 per cent; in 1905, 25 per cent; in 1921, even after dissolution of the Temple Iron Co., 24 per cent, and, indeed, if the Susquehanna Collieries Co. be included with the railroad group, the proportion contributed by the independents in 1921 would be only 19 per cent.

Present Degree of Competition.—The question squarely before the public is, which better serves it in certainty of supply and in quality and price of product, the large or the small anthracite companies?

It remains to be seen what effect the Court dissolutions may have on the price of coal. There is no effective competition between "railroad" companies, even though there is a range of 35c. between the highest and lowest of the circular prices for the same sizes of coal. Changes in circular prices have been upward rather than downward since the Court decisions were made. The abrogation by the Supreme Court of pooling contracts has enabled the individual operators outside the pool to get their share of the business, but only when the market has been dull have these and other independent operators sold at prices near the circular prices.

With coal leaving the different mines at two or more distinct price levels, one dealer in a community may be receiving coal at two or even three dollars a ton less than is paid for coal of the same quality by his competitors. In time of good demand the dealer who gets the lower-cost coal may allow his competitor who gets the high-cost coal to fix the price to the consumer, though often the practice of the dealer

buying low-cost coal of adding the customary margin to his purchase price has been followed. This practice, however, results in widely different prices to different consumers for coal of similar quality, or in the equally vexatious advance in price to the same consumer later in the season if the dealer has to supplement his allotment of "company" coal with some "independent" coal. An extortionate retailer needs only to cite the premium price he has paid for a few carloads of independent coal as a screen behind which no local authority can well go, far less an individual customer.

Realizing this unfortunate effect of high-cost coal in the local market in raising the level of retail prices out of proportion to the relative tonnage of the premium coal received, the Commission is convinced that the public would benefit by increased production by the larger and lower-cost companies, and that if adequate publicity could be given to costs and prices at the mines, to freight rates, and to costs of local distribution, the buyer of household anthracite would thereby gain some measure of protection against the demands of unscrupulous dealers. If there be a monopoly in effect it is not in the sense of pooling cost and profit among the "railroad" companies but in the sense that practically uniform prices have been charged by the "railroad" group. From the consumer's point of view the retailer in his purchase of "company" coal might about as well be dealing with a single corporation charging a single price, since differentials are less than 5 per cent among circular prices of the "railroad" companies.

The present differentials in price made by the several "railroad" companies constitute some recognition of the right of the public to share in the advantage of the low-cost concern, but these differences in mine prices are far from reflecting the actual differences in mine costs. While because of great variation in natural conditions certain large companies have costs even $2 below the costs of other companies less fortunately situated, yet little of this advantage accrues to the public. Even when the difference in mine price is passed on without change to the consumer, the result is not equitable; for example, only one consumer in six in New England last winter got the lowest-priced coal.

Real benefits have flowed to the public from strongly financed companies, although these benefits were largely offset in earlier years by the illegal practices which the courts condemned. The anthracite mines have conserved the country's coal resources by steadily increasing the percentage of coal in the ground recovered and sent to market; they have economized in the capital employed by a closer adjustment of mine capacity to production and in man power by largely eliminating the cost of idle days for men as well as for plants, resulting in a corresponding improvement in the economic condition of the mine workers.

The development of large and strong companies with centralized control may be a source of danger as well as of benefit. For example, the ability to stabilize prices that was used last winter by the larger companies to benefit the public contains also the inherent possibility of real danger. Ownership by the railroads of mines whose product they transported resulted in conditions fundamentally unsound. Financially weak roads have owned what are believed to be profitable mines, much stronger roads have been burdened with much poorer mines, and dividend-paying roads have been favored with dividend-paying mines, with the net result that the record of this mixture of transportation business with mining business is full of uncertainties as to what have been the real profits and on what investment these profits have been earned. It is a wise national policy that has forced the separation of the two types of business the actual relationship of which should be publicly known, not concealed in a maze of accounts.

Capital Costs.—While labor cost, which has been considered in many aspects in a preceding section of this report, is the outstanding item in the cost of mining anthracite, there are two others which though much smaller in amount also show large increases in the past ten years. The cost of supplies, as would be expected, somewhat more than doubled, being for 12 identical companies 35c. to the ton mined in 1913 and 72c. in 1923. The total of the items grouped under "general expense" has nearly tripled, from 33c. in 1913 to 93c. in the current year.

Three of the items under general expense—royalty, depletion, and depreciation—are directly related to capital, and affect the few thousand men and women who hold investments in coal lands or in stock of the operating companies. These three items, in returns for 1921 from 67 companies showing an average for general expense of 90c., together make up 45c. while state and local taxes amount to about 21c., and compensation insurance 7½c. For depletion the average charge reported was 15.8c. per gross ton; the average for depreciation charge for the same companies was 10.8c. Excluding, however, the two "railroad" companies that carry no depreciation account, the average charge is about 15c. Depletion charges range from 7 to 32c. for the "railroad" companies; from 8 to 50c. for the "independents."

Royalties.—About a third of the output of anthracite is mined under leases in which the operator pays the landowner a royalty. The royalties collected on fresh-mined coal range from as low as 12c. on old flat-rate leases to as high as $1.50 per ton; on percentage leases and on certain stripping operations the rate is even higher. The royalty rate of the Girard estate leases for 1921 averaged $1.27 per ton on all coal mined, 2,983,723 tons. As the Girard lands are in the Schuylkill region, where mining costs are relatively high and the percentage of domestic sizes relatively low, they are intrinsically less valuable than the lands in some other parts of the region. The high royalties of the Girard estate therefore suggest the profit that inures to the more fortunate operating companies simply in their capacity as land owners. For where the land is held in fee, the mining companies' costs are lower by the difference between the depletion charge and what they would pay as royalty if they were lessees, and there is the possibility of that much higher margin.

The land-holding companies and estates thus share in the monopoly power possessed by the anthracite operations. To protect the public against abuse of this monopoly power, they should be required to file periodic statements of their costs and profits in relation to investment under the program of publicity elsewhere proposed.

Among the independent operators the great bulk of the output—at least 70 per cent—is produced from leaseholds under royalty. Among the "railroad" companies the great bulk of the output is produced from lands in fee. Royalties are therefore not an important item in the cost of producing "company" coal. They are an important element in the cost of producing "independent" coal.

Before the war, over a year as a whole the prices of the independents were about the same as the circular prices of the "railroad" companies, and royalties had a fairly harmonious relation to circular prices. As prices rose, however, the normal relation of royalty to selling price was distributed. When the royalty was limited to a flat rate, the operator profited greatly by the rising price. When the royalty increased with the rise in price, as in the Girard Trust and certain other leases, the operator often found his costs increasing much faster than his margin and was forced to demand higher prices. The result in too many cases has been a vicious circle in which "premium" prices for coal caused an increase in royalty, which in turn was made the occasion for further demands upon the consumer, the only limit to the process being what the traffic would bear.

Royalties thus became a contributing cause of premium coal, and a charitable institution in Philadelphia became the unwitting beneficiary of the distress of the poor in other cities. Thus, although the royalties collected by the estate of Stephen Girard averaged only 31c. a ton from 1899 to 1913; in 1914, under new 15 year leases beginning that year, they averaged 52c. and in 1921 they had risen to $1.27. Because of the public nature of the Girard Trust considerable attention has been attracted by these rates, when as a matter of fact they are not the only high royalties in the region. One operator reported to this Commission that in 1921 he paid to another estate an average royalty of $1.50 a ton.

These royalties received by land owners not actively engaged in mining give some idea of the monopoly value of land underlain by workable beds of anthracite. That value is largest and a large royalty best warranted where physical conditions favor cheap mining, as in some stripping operations, which yield large profits even though a high royalty also is paid. A rate, however, that exacts the same royalty from properties whose direct operating costs, exclusive of royalty, may be higher than even the circular price is inequitable and demands some relief as was granted in 1920 by the Girard estate and at least one other land-owner. In theory the justifiable interest of the land owner should be a share of the net returns, and it is the method of determining royalty as a percentage of gross receipts, and those often at the highest prices, that has led to the recent marked rise in royalty charge.

The "sliding scale royalty" may work a hardship on the operator in that it disregards the fact whether he realizes a profit or not, and it may work injury to the consumer by its influence in still further raising the premium price. One suggestion is that all existing leases with this sliding scale royalty be amended to refer to the circular price instead of to the premium price taken from the distressed consumer. Land owners can well offer this equitable adjustment since the royalty would surely exceed their fondest expectations of ten years ago. The owners of anthracite lands should be as much concerned as others in the industry—operators and mine workers—in setting the house in order to avoid any future demand for drastic regulation for the protection of the consumer.

Ten-Year Record of Margins and Profits in the Anthracite Industry

Margins and Profits.—The Commission has not completed its study of investment and therefore cannot yet state what the profits have been in terms of return on investment. It has completed a study of mine costs and sales realizations which throws some light on profits. Since only the sizes above pea sell at prices generally higher than the average cost of mining and the smallest sizes considerably below that cost, market prices give little clue to margins except as the operator's proportion of large or domestic sizes and small or steam sizes is known. However, the average sales realizations on all sizes have been reported and can be compared with average costs for the same companies over the series of years.

For the 12 companies the average of these sales prices received ranged from $2.63 in 1913 to $6.78 in the first quarter of 1923. Distinguishing between the "railroad" companies and the larger independents, the 9 railroad companies received for all sizes an average price 28c. lower than that received by the 3 independents in 1913, and 89c. lower in 1923. Part of the difference is due to the fact that two of the "railroad" companies turn their coal over to affiliated sales organizations at transfer prices considerably below circular.

The margin per ton between cost of production and net sales realization includes all the earnings from the mining of coal available for payments on account of capital, whether paid out in federal taxes, as interest, as dividends, or reserved as surplus. The margin will not show return on investment until the amount of the investment is established, but it will indicate whether over a period of years profits are increasing. This margin is simply what capital, whatever its amount in the business, receives for services rendered in mining the average ton of coal, and thus the margin per ton as capital's wage is fairly comparable in nature with the wages paid per ton to the mine labor.

Measured by this margin per ton the anthracite operators are receiving much larger profits at present than they customarily did before the war. For the year 1913 nine "railroad" coal companies had an average margin of 36c. a ton. In the first quarter of 1923 the same operators received a margin over reported costs of 93c. a ton. But because of differences in accounting methods in respect to depletion and depreciation, these reported costs, although following the Treasury Department's requirements, are not strictly comparable with the costs as determined by the Federal Trade Commission for earlier years. To make them comparable it is necessary to deduct 14c. from the costs as now reported and add 14c. to the margin. This would make the 1923 margin $1.07 per ton, or three times the pre-war margin. The trend of margins through the period is indicated by the following table:

TABLE XVI—CHANGES IN MARGIN PER TON RECEIVED BY NINE RAILROAD COAL COMPANIES, 1913-1923

Period	Margin Reported By Federal Trade Commission	Margin Over Costs Reported To Coal Commission	Margin Adjusted So As To Be Comparable Throughout Period
1913	$0.36		$0.36
1914	.37		.37
1915	.33		.33
1916	.39		.39
1917	.63		.63
1918	.38		.38
1919		$0.43	.57
1920		.36	.50
1921		.67	.81
1922 1st quarter		.31	.45
1922 2d and 3d quarter		Suspension	Suspension
1922 4th quarter		.91	1.05
1923 1st quarter		.93	1.07

The difference in accounting methods between the cost investigations of the Federal Trade Commission and the costs submitted to the Coal Commission by the operators will be discussed in detail in a special report on costs and profits. The difference in method does not invalidate comparison between costs of several operators when calculated by the same method. To compare costs as ascertained by one method with costs as ascertained by the other, however, requires the adjustment above noted. Thus, the average margin in the four years before the United States entered the war was 36c. In 1919 the average margin (adjusted) was 57c. In 1920 and 1921 it was 50 and 81c., the variations in these years representing in part movement of steam sizes into storage and out of storage to the market. During the suspension of 1922 the companies lost money heavily, but in the last three months of the year, their margin (adjusted) was $1.05, or three times the pre-war figure.

Further evidence that the profits of the anthracite companies are increasing is found in the increase of their surplus accounts. There are five "railroad" coal companies engaged exclusively in the mining of coal that have been paying dividends in recent years. The total surplus of these five companies rose from $7,000,000 in 1911 to $52,000,000 in 1920. In other words it increased sevenfold in ten years. The following year (1921) it dropped to $36,000,000, chiefly because of the payment out of surplus during 1920 and 1921 of very large dividends by four of the five companies. This statement does not include the Philadelphia & Reading Coal & Iron Co., which showed an increase in surplus account, but paid no dividends, and practically no interest on advances previously made to it by the Reading holding company. Neither does the statement include the Scranton Coal Co., which pays no dividends. The increasing surpluses of two other "railroad" companies are omitted because they report transportation income as well as coal income.

These figures of increasing surplus do not of themselves show what the profits have been; all that they show is that compared with pre-war conditions present profits show a large increase.

The net income accounts of the anthracite companies also show an increase. In 1913, the combined net income of eight railroad coal companies that produce 57 per cent of the output was $13,600,000. This statement includes the net earnings from the coal departments of two companies engaged both in mining and transportation but excludes their earnings from transportation. In 1920 the net income of the same companies had risen to $33,000,000. In 1921 it was $27,000,000, or twice as great as in 1913. The production of the eight companies during this period showed practically no increase.

Until the total earnings can be compared with the total investment, the public should withhold judgment as to the profits received by the anthracite industry. It may be that judged by this standard, the margin obtained before the war was too small. If, on the other hand, the pre-war margin was adequate, the present margin may be unduly large, unless in the meantime there has been a marked increase in the investment. The task has proved so involved and far-reaching that the findings of the Commission on the subject of the profits of anthracite companies are reserved for a later report.

The work in hand involves examining the books of operating companies and their related sales agencies. From the reports of the Commission's examiners so far obtained it is not possible to generalize as to the average rate of profit on the aggregate investment in the anthracite industry. The Commission finds that some of the lower-cost companies have been extremely profitable and have paid very large dividends even though their sales prices have been relatively low. It has found other companies with higher costs whose rates of return have been small and which have paid small dividends or no dividends at all, but until the study of investment is completed, the evidence of dividend payments must be accepted as an indication rather than explicit proof of profits. In a number of important companies the outstanding capital stock represents but a small portion of the book value of the property.

Whether the peculiar corporate organization of the anthracite industry has been helpful or harmful to the public turns in the last analysis on whether its profits have been reasonable. The fact of an economic concert amounting to combination is established beyond reasonable doubt. Its capacity for public service is demonstrated. The point upon which the public demands explanation is whether or not it has used its monopoly power to extort exorbitant profits from the consumer.

Compulsory Rendering of Cost, Price and Profit Reports Recommended

Publicity of Accounts.—Regardless of the final verdict as to reasonableness of profits the Commission is convinced that publicity of costs, prices and profits must be provided to protect the interest of the public. At present the current reports published by the Federal Government deal only with statistics of labor, production and stocks of coal, and even these are returned voluntarily and there is no power to go behind the figures submitted. Most of the companies file these voluntary reports promptly and cheerfully, but certain ones do not.

During the crisis of 1922-23 the reports on coal storage issued by the Federal Fuel Distributor did not contain the all-important information on stocks of anthracite held by the producers because the Hudson Coal Co. was unwilling to furnish its share of the information. The Commission, therefore, recommends legislation providing for regular accounting reports to be rendered by all companies whose product moves in interstate commerce, and further recommends that the agency to which the reports are rendered shall have the power to prescribe the form of accounts. The opportunities for inflating figures of costs are so numerous and the questions as to how investment shall be reckoned are so unsetled that without such continuous publicity the Commission fears that the concentrated control of the anthracite industry may take indefensible profits.

It is found for example, that two of the largest companies carry no depreciation account, but charge certain outlays for replacement direct to operating costs. Without the most minute checking of each item it is impossible under this arrangement to be sure that items properly chargeable to capital account have not been included in current costs. The field accountants of this Commission report that some of the companies in earlier years charged off against current operations the entire costs of new plants, equipment and development work, which good accounting practice would recognize as legitimate capital charges. This subject will be discussed in detail in the Commission's final report since it concerns also the bituminous industry.

Measure of Investment.—The Commission has found itself confronted with conflicting claims as to the basis upon which the rate of income should be reckoned. One claim is that the market value is the proper measure of the investment. In the anthracite industry, however, the market value depends upon profits and prices of anthracite for the last 25 years, and has been influenced more or less by the operations of what the Supreme Court of the United States has declared to be a combination in restraint of trade and in violation of the commodities clause of the Hepburn Act.

Another claim is that income should be reckoned upon original cost. Another that the investment should be reckoned in accordance with the rules prescribed by the Treasury Department in the income tax returns. Still another suggestion has been that the rate of income should be reckoned upon the cost of reproduction. There is no such thing as reproducing an exhausted coal mine.

The Commission deems itself justified in finding as a fact that the mining, transportation in interstate commerce, and sale of anthracite coal impresses that commodity with a public use. It is not strictly analogous to but bears some resemblance, therefore, to the problem of valuing a public utility for the purposes of regulating rates. It will not be found that the courts have laid down a single formula for ascertaining values. Each case seems to rest upon its own merits. They have considered original cost, stock and bond issues, and cost of reproduction and have been governed in their decision sometimes by one element and sometimes by another.

Cost of reproduction might well be reported as a fact with reference to the plants and equipment, for that would give a fairly definite figure, but as the greater part of the investments claimed by the anthracite companies is in coal-bearing lands, reproduction of course cannot apply to these lands, because the lands cannot be reproduced. Present market value may not afford a satisfactory basis of valuation because there are no lands of like character anywhere else, because they are not in the market for sale save as they may in rare instances from one operating company to another, and because such sales as do take place are of course at prices which reflect current profits.

As the Commission is not called upon to judicially determine the valuation of these plants and these lands, nor to state how a public official, state or federal, shall value the same for taxation or other purposes, it does not deem it prudent to lay down a rule for making such valuations. There will of necessity enter different elements in fixing the values of each company should the courts be entrusted with the discharge of this duty. If the rule shall be adopted in these valuations analogous to that of public utilities then of necessity the Court will consider its original cost or investment as part of the evidence in the case although not necessarily conclusive as the value thereof.

As furnishing the necessary facts for the making of this valuation the Commission will set forth in its report on the investment and profits for the use of the Congress and the public all the information on these subjects which it has been able to obtain, whether relating to original cost or investment, outside capital from time to time put into the business, earnings that have not been drawn out but left invested, as well as dividends paid, additions made to book value by reason of revaluation, whether based on actual appraisals or otherwise, statements of investment made for taxation purposes, and current market value.

The valuation of coal lands is not like the valuation of farm lands, where the value is determined by the free play of competitive force as millions of owners buy and sell, rent and mortgage. The anthracite industry is not governed by the free play of economic force. The crowding of the resources into an area of less than 500 square miles, concentration of that resource in the hands of a few large corporations that own 90 per cent of the reserves, the elimination of competition in price between them, the recurrence of shortage and consequent high price that may arise at any moment through the exercise by the trade union of its monopoly control over labor at the mines requires some measure of protection for the consuming public in the just and equitable valuation of these properties. The profits of the anthracite companies will look large or small according to the value that is ultimately determined to be fair for the coal-bearing lands.

Deficiency of Production.—A concise statement of the record of anthracite production is that for twenty years before 1913 production has followed closely the increase in population and since then it has not kept pace with the population either in the nation or in the States which rely upon anthracite as household fuel. From 1913 to 1922 the total production of anthracite remained practically constant except for the extremes of the record year of 1917, when it rose to 99,611,811 net tons, and the suspension year 1922, when it fell to 54,683,022 tons, while the population is estimated to have increased in the same period about 15 per cent. This steadiness of output is in marked contrast with the extreme fluctuations in the bituminous industry, which in a large way reflect nationwide business conditions; and the recent lag in increase of production as compared with population is equally in contrast with the rapid increase in bituminous production, which follows the growth of industry rather than that of population.

The inference should not be drawn, however, that there has been no large increase in output of anthracite. An interesting comparison can be made with the conditions 20 years ago. The Roosevelt Commission assumed that anthracite production would reach its maximum limit at 60 to 75 million long or gross tons, whereas the actual output in 1917 and the six months of 1923 indicate that whatever may be the potential market capacity, the present mine and washery capacity is at least 90 million gross tons a year. More significant is the progress made in 20 years in lessening the wide gap between mine capacity and actual output; with approximately the same number of mine workers, the production was 50 per cent greater in 1920 than in 1900. To

that extent the anthracite industry was once overdeveloped and overmanned much as is now the bituminous industry.

In the past two decades the geographic changes in the distribution of anthracite have been slight. The natural market for this superior household coal is in the nearby regions of longer and more severe winters, and the Northern States, with Canada, have increased their quota at the expense of the Southern and Western States. In the present distribution of the sizes suitable for household use 74 per cent goes to the states between Maine and the District of Columbia, and of these states only Maryland and Pennsylvania are coal producers. An additional 7 per cent goes to central Canada. Pennsylvania herself consumes only about the same quantity of domestic sizes as New England and less than half as much as is shipped to her nearest neighbors, New Jersey and New York. These facts illustrate interstate dependence.

A study of the present distribution of domestic anthracite has brought to light no evidence that economic combination takes the form of concerted partition of territory, either among the larger companies or between the "railroad" and the "independent" companies. A few localities are served by a single company simply by reason of the logical relation of railroad routes. Most of the time beginning with 1917 the increasing demand and stationary supply have made the dealers compete for shipments often regardless of prices. Competition by the operators for territory without, even then, any competition among "railroad" companies in price has largely given place to an allotment system under which it is recognized that the first obligation of a mining company is to its former customers, a principle first proposed and made mandatory by the Federal Fuel Administration in 1918 and again enforced in the past winter by the Committee on National Distribution. Should any surplus supply of anthracite seek a market, the former active competition in salesmanship and advertising might be resumed.

The Problem of an Insufficient Supply of Anthracite

Causes of Shortage.—Insufficiency of the available supply of anthracite is the acute problem of the moment and the serious problem of the future.

The failure of the anthracite industry to furnish an abundant supply of the domestic sizes is generally not due to a lack of transportation facilities, as in the soft coal industry. Among the anthracite operators complaint of car shortage is rare. The failure to visualize the magnitude of the traffic involved in taking the daily output of anthracite to market leads to misapprehension.

Travelers in the vicinity of the anthracite mines notice loaded coal cars on the sidings and infer that coal is being held back from market with a sinister purpose. The fact is that for several months past, from 6,000 to 7,000 cars have been loaded each working day at the anthracite breakers, so that 45 to 50 miles of cars start on their journeys each day. In the course of making up trains and despatching them, standing cars as well as moving cars must naturally be seen. In its recent decision on the distribution of coal cars the Interstate Commerce Commission specifically mentions the absence of any reason for continuing the investigation of carriers serving solely anthracite mines. Such community of interest as may exist between the mining of anthracite and its transportation has the beneficial effect of co-ordinating car supply and colliery output.

With one exception, the periods of shortage in the supply of anthracite have been associated with suspensions or strikes at the mines. The one exception was the period from the fall of 1916 to the spring of 1918, when increased demand resulting from the war, coinciding with a shortage in the supply of bituminous coal, made an unprecedented demand upon the anthracite industry. To that increased demand operators and mine workers responded to the best of their ability, and the difficulties experienced by consumers during that period must be laid to the strain of the war, to an exceptional severity of weather and, so far as Western communities were concerned, to the necessary restrictions of the Fuel Administration on westward transportation, rather than to any deficiencies in the anthracite industry itself. Though the number of mine workers was materially decreased, their response to the special demand established 1917 as the record year in anthracite production. Undoubtedly, the increase in output carried with it some decrease in quality.

The other periods of shortage have been directly connected with suspension of production at the mines. The country has not forgotten the effects of the great strike in the summer of 1902 upon the supply during the following winter. A shorter suspension at the expiration of the wage agreement in 1912 also was reflected in more or less distressing scarcity of household fuel in the following winter. In that year the mines were idle for 40 days and in the following winter, although this may not be generally remembered, high prices led to a federal investigation.

To produce the increased quantity demanded, without any corresponding increase in the capacity of the mines and even with an actual decrease, involved working the mines more and more steadily. A 20-day "vacation" in which three-fifths of the men in the anthracite region were idle in September, 1920, in protest at the award of the Anthracite Coal Commission, led to a distinct flurry in the market in the next winter, with local complaints of scarcity of coal, unreasonable prices and inferior quality.

Experience of 1922.—From the effects of the long suspension in 1922 we have not even yet recovered. For more than five months in that year not a wheel turned in the anthracite region. The suspension of mining reduced production for the year 40 per cent below the normal output. A 60-per cent supply had to serve. To protect the public from extortion and inequitable distribution of this partial supply the coal operators promptly joined public officials in making the best possible allotment. The close-knit organization of the anthracite industry made possible an effective control of distribution.

All but one of the larger companies, the Hudson Coal Co., pooled information regarding the distribution of their product in previous years, and after mining was resumed it was possible to keep an accurate check on the weekly distribution of 85 per cent of the available coal. A system of allotments was established by which each community received during the winter of 1922-23 a proportion based upon its purchases in previous years. This would have been impossible in the competitive bituminous-coal industry, which possesses neither the records, the machinery nor the discipline necessary for such an undertaking.

The control of prices at the mine in the winter of 1922-23 was almost as successful as control of distribution, although the acts of a small minority of operators and jobbers and dealers largely prevented the consumers from receiving the full benefit of this control. Realizing the hardships that a runaway market would inflict upon those least able to pay high prices, the Pennsylvania Fuel Commission, with the co-operation of all but a few operators, mostly irresponsible persons attracted to the business by the existing shortage, fixed a scale of "fair prices."

According to the Pennsylvania Fuel Commission the coal mined by the "railroad companies" and certain independents, over 77 per cent of the total, was sold at $8.50 or less, these circular prices being adhered to at this time of acute shortage just as in a time of abundance. Unquestion-

ably these large producers might have obtained from the retailers of anthracite during the past winter much higher prices. *This Commission desires to pay public tribute to the restraint and good judgment displayed by the responsible shippers of anthracite during that trying period.* In a less centralized industry prices could have been held down only by arbitrary government action such as was authorized during the war by the Lever Law.

The amount of anthracite now being mined, shipped and distributed equals that of the war period. The total production in the first half of 1923—over 50 million short tons—equals the maximum recorded for a half year.

The strength of the market at the present time is good evidence not only of the apprehensions of buyers, which may be allayed by the renewal of the agreement between operators and miners, but also of the popular belief among one-third of the American people that "coal" means "anthracite," and that they must look to the anthracite mines of eastern Pennsylvania for their fuel. It is this ingrained preference for the clean and smokeless and slow-burning coal that enables at the present moment the smallest and weakest independent producers to obtain a price \$2 or \$3 above that at which two of the largest and strongest companies sell equally good if not better coal. Of course, these companies cannot immediately take on new customers.

The same preference for anything bearing the name "anthracite" permitted the sale of scattered carloads of "fireproof" coal at "bootleg" prices, while 77 per cent of the available supply was furnished by the "railroad" companies to their customers at little if any increase over former prices. These companies, however, did not in 1923 make the custommary summer discounts. The excess of demand over supply has become the rule in recent years, and in the face of this excess of demand there plainly has been no definite economic relation between "company" prices and "independent" prices. In earlier years, after the termination of the pooling contracts, the price of independent coal fluctuated with the law of supply and demand, these smaller operators reaping an occasional rich harvest in time of panic or shortage, maintaining prices above the level of the "circular prices" in times of active demand, and cutting below that level and even at times selling coal at a loss when the demand was sluggish.

Need of Greater Capacity.—The usual undersupply of anthracite and the frequently recurring extreme shortages together make unnecessary any overt act to control the market; even with a potential monopoly of production it is not necessary that there should be a combination in restraint of trade in the legal sense to explain present price levels. If there is any well-founded suggestion of concerted action it is shown in the small range in circular prices, the extremes in prices of company coal of domestic sizes being only 35c. although all this coal could be sold at the higher circular price and probably much nearer the price level of the independent coal. Doubtless both business sense and regard for public opinion have led these strong companies to acquiesce in the noticeable differential between their own prices and the higher prices of the independents.

Only 6 per cent of the coal left the mines during the past winter, according to the Pennsylvania Fuel Commission, at prices of \$10 to \$12, as against 77 per cent at the circular prices of \$8.00 to \$8.50. The influence of this relatively small tonnage of extremely high-priced coal on retail prices, together with that of an insignificant quantity of coal of poor quality put on the market at even higher prices by irresponsible operators in defiance of the State Commission was, however, all out of proportion to its amount.

The conservative policy of the larger operators in stabilizing the market is based no doubt on sad experiences of the past, when unrestricted production caused disaster from which everyone connected with the industry suffered. This policy may be carried too far. If production is kept under demand, as it has been over many years, any temporary disturbance will of course give opportunity for swollen profits. Full credit should be given to operators, jobbers and retailers who for any reason do not take advantage of this chance to profiteer. The "companies" and some of the independents as well as many retailers and wholesalers deserve this credit. This does not, however, absolve the anthracite operators from responsibility for creating the permanent conditions which in a crisis make such profiteering possible; and even in a crisis the wholesalers and retailers cannot justify a sweeping advance in prices by any evidence which the Commission has obtained as to what they actually paid for premium coal and the amount of it which they actually bought.

It is very desirable to prevent the panicky market which results from the stoppage of production; but it is also desirable that the normal demand for anthracite shall be met and that this shall be done at a lower price level if by any reasonable reduction of royalties, operating costs, freight rates or profits this is possible. The coal companies should not be allowed to hold large reserves indefinitely, instead of developing them. Such a policy would make the coal last longer, and this is sometimes defended as conservation. But a sound conservation policy does not require the present generation to pay extravagant prices or resort to inferior substitutes for the sake of a doubtful benefit to posterity. Genuine conservation will prevent waste and encourage the mining of even high-cost thin seams when the coal would otherwise be lost altogether, but will not countenance the holding reserves undeveloped for the purpose of stabilizing prices at a high level or insuring future tonnage to particular railroads.

Whether to increase the capacity of the anthracite mines or to make better use of present equipment is an economic as well as an engineering problem. It is estimated there remains a little less than fifteen billion tons in these Pennsylvania fields. The capacity to mine the anthracite is dependent on underground development, and the equipment of mines and breakers, and the available labor supply. Of these two factors the lack of labor is the more serious in that without an adequate labor supply mine-development can not be expanded. The number of employees in the production of anthracite reached its maximum of nearly 180,000 in 1914, but in the two years of maximum output, 1917 and 1918, the labor supply was near its minimum, only 154,174 and 147,121 respectively.

The explanation of this apparent anomaly lies in the exceptionally large number of days worked in those two years—285 days in 1917 and 293 days in 1918—and in the notable increase of efficiency of the miners in the war period. At the present time the rate of production of anthracite is fully that of the record year 1917, and again this high rate of approximately one hundred million net tons a year is maintained by the steadier operation of the mines and the more regular attendance of the mine workers rather than by any increase in mine development or labor supply.

Capacity is measured by the quantity of coal that would be produced if the mine were worked full time at the actual daily rate for the particular year. The conclusions of the engineering staff point to a decline in colliery capacity during the past ten or twelve years. Nor, with one exception, is there now in progress any new mine development of consequence to offset the normal reduction in capacity by wearing out of plant or mining out of reserves. The observations of the engineers, however, are in line with the labor studies to the effect that the present deficit in labor is a shortage of miners' laborers rather than of miners themselves, so that at present the limitation of capacity can not be charged to the Pennsylvania requirement of certification of miners.

More unskilled miners as well as laborers will, however, be needed to maintain production, to say nothing of increasing it, for there are factors at work tending to lower the production per man. There was an apparent increase thirty years or so ago, due to the increasing use of small sizes which before had gone to the waste pile. Whereas the output per man per day in the bituminous industry is increasing steadily, in the anthracite industry it is less to-day than it was twenty years ago. For the past ten years the daily production of fresh-mined coal per man employed underground has been practically stationary.

Chief among the factors tending to decrease the production per man is the constant decrease in thickness of beds worked and to the increase in depths of working, both items making for increased mining costs. Nor is the outlook encouraging when it is realized that the Northern field, in which the mines yield 70 per cent of domestic sizes, is being exhausted much more rapidly than the Southern field, where the mines yield only 53 per cent of domestic sizes. At the present time the average mineworker in the Northern field produces nearly 30 per cent more domestic coal than the mine worker in the Southern field. Yet it is from this Southern field with its greatest reserves that the future supply of domestic anthracite must come in increasing degree.

It is impracticable to attempt any quantitative statement

of the extent to which loss in labor efficiency has tended to reduce productivity. That there is some tendency to limit each man in the amount of coal to be mined and loaded in accordance with local feeling and tradition is not seriously denied. The introduction of labor-saving or product-increasing machinery although not opposed by the miner in principle gives occasion for vexatious and expensive delays in discussion over the conditions under which it is to be used, the rates of pay, the number of men on a machine, etc.

It would be to the interest of the industry as a whole as well as to the public interest if the miners' organization should become an active and aggressive instrument of greater efficiency in mining, co-operating heartily with the management in every effort to reduce mining costs by preventing waste, abandoning obsolete practices, diminishing labor turnover and in all other ways helping to establish good production standards.

Improved mining methods and mine machinery have of course slowed down the decrease in productivity, but even then the rate per man per day was only 2.09 tons in 1921 as contrasted with 2.50 tons in 1899. Better engineering should help to compensate the natural factors making for decreased output and thus give the consumer the anthracite he needs.

The engineering study of the breakers, where the mined coal is prepared for market, indicates a reserve daily capacity one third in excess of actual production in 1920. Indeed, this unused capacity is estimated as sufficient to handle the output of some 43,000 more men than were employed in 1921 and 13,000 more than the highest number ever employed. This unused breaker capacity might add something like 20,000,000 tons a year to even the present high rate of output, adding nearly 12,000,000 tons of domestic sizes.

The high-cost mines as a rule are more expensive in manpower and yield the lowest return in coal for a day's work, with the result that high prices which keep these mines running also tend to decrease the average productivity of mine labor. With these relatively high-cost and inefficient mines in operation the only practical method of increasing the supply of domestic anthracite is to recruit the labor supply of the lower-cost mines to full breaker capacity.

When the working capacity of present mine and breaker development has been reached, the question of double-shift operation should be considered as well as the opening of new mines or the building of new breakers. It is economy to make this more continuous use of the equipment which represents so large a part of the necessary investment in the anthracite industry. The difficulties in the way of establishing a new practice in this respect are recognized but they are not insurmountable.

The Commission concludes that at present the supply of unskilled laborers is the immediate limiting factor in anthracite production. This has been the condition since 1916. It may not be described, however, as a physical limitation over which the operators have no control. Other industries employing similar labor have increased the working forces during this period, notably the bituminous mining industry, to an excessive degree. It therefore appears that earnings and conditions of labor offered by the anthracite industry viewed in the aggregate have not attracted labor in the same degree as have the wages and conditions offered by other industries.

Better Combustion Practice and Use of Substitutes the Consumer's Responsibility

Improved Practices.—Better utilization of the anthracite that is mined is a problem in national economy in the solution of which anthracite consumer and anthracite operator must join. In terms of total annual output the supply is stationary; in tons per capita it is declining.

Improved practices in the use of anthracite as well as in its preparation that promise some relief relate to the sizing of anthracite and the disposition of the smaller sizes, better inspection of the coal as it leaves the breakers, use of substitutes and better fuel economy in household heating.

Simplified practice in sizing of anthracite is needed. Coal is now commonly sold in four domestic sizes—egg, stove, chestnut and pea—and three steam sizes—buckwheat, rice and barley. To prepare these seven sizes and keep them separate in their journey from mine to destination adds to the cost. It adds to the cost of preparation and it decreases in proportion the domestic sizes through breakage in repeated crushing of the lumps. It adds to the cost of switching and handling at railroad terminals and tidewater piers. It adds to the cost of the retailer, who must store and truck the several sizes separately.

Reducing the standard sizes from seven to four, as proposed from time to time and as already practised in part by one of the large producers, would reduce costs and increase the amount of domestic coal available. It would facilitate wider use of small sizes for heating.

The Commission therefore urges that the question of simplified sizing be considered at once by a joint conference of producers, railroads, retailers and chairmen of state and municipal fuel committees, and that the Bureau of Mines be consulted in determining the sizes to be produced and in reporting on the relative heating values of the present and proposed sizes. The simplification is recommended in the interest of the public.

To dispose of the steam sizes is perhaps the chief problem of the anthracite operator. It is also a matter of vital concern to the householder, for the present loss on the scale of the steam sizes has to be charged against the price of the domestic sizes. As the mines become deeper and as the center of production moves toward the pitching measures of the Southern field, the percentage of steam sizes is expected to increase.

Hope for wider demand for these small sizes, that will absorb the increasing output, is found in the trend of combustion engineering. The engineers of the Commission expect improvements in the manufacture of briquets and in burning powdered anthracite for power generation. If the superpower plan, outlined by the Geological Survey, is carried out, large central stations will be built near the anthracite region and will absorb millions of tons of the fine sizes. The problem calls for educational salesmanship on the part of the anthracite operators and receptive co-operation on the part of the consumer.

Complaints of poor quality of coal are a common feature on the recurring shortages of anthracite. The complaint is not confined to isolated carloads of "fireproof" coal shipped by "snowbird" operators. There is a widespread feeling that quality deteriorates during periods of scarcity and that much dirt, slate and bone is passed on to the consumer. It is this feeling that has inspired bills providing for government inspection introduced both in Congress and in the legislatures of several States.

It is not possible to ascertain what per cent of coal shipped during the crisis of 1922-23 carried an unreasonable amount of ash. It is know that many of the responsible shippers have not relaxed their standards of preparation. Those shippers have every reason to join with the public in support of some plan to protect the good name of their industry by guaranteeing the quality of the product.

The Commission therefore suggests to the anthracite producers that they join in an intercompany inspection service, which shall be empowered to prescribe standards, inspect and sample shipments, reject inferior coal and certify—if not guarantee—the quality of coal passed. Membership in the inspection service should be optional, but few producers could afford to stay aloof from such an association, when once established.

To this plan the objections commonly raised to grading do not apply. The sizes of anthracite are already largely standardized and the number of grades is small compared with bituminous coal. It is not proposed to abolish trade names which represent an investment in good will, but merely to certify that the coal in question reaches a minimum standard of quality.

As a pledge of good faith to the public the Commission suggests that the operators invite the U. S. Bureau of Mines to participate in the proposed inspection service both by technical advice in laying down standards of preparation and by detail of a fuel engineer to observe and check the work of inspection and grading.

Co-operative inspection is preferable to compulsory government inspection because it can be inaugurated at small expense by consolidating the inspection forces already maintained by many of the companies and because it is in line with the idea that the responsibility for management should be thrown back upon the industry itself. If, however, this proposal is not accepted by the anthracite trade or should it not in practice effect the desired purpose, the Commission recommends that a federal law should be enacted for permissive grading and inspection.

To eke out the inadequate production of anthracite each year the waning supply must be supplemented by increased use of other fuel. In the anthracite-consuming territory proper, convenient substitutes are not generally carried by the retail trade. The nearest bituminous mines are a hundred miles farther away and therefore pay higher freight charges. Very few mines in the bituminous districts adjacent prepare their coal in the sizes convenient for household use. So ingrained is the habit of using anthracite that there is little effective competition with other fuels. They have not displaced anthracite; they have supplemented it. Competitive relations have tended to advance the price of substitutes quite as much as to depress the price of anthracite.

The most promising supplementary fuels are small sizes of anthracite, used either in specially designed furnaces or in present furnaces either in the form of briquets or mixed with the larger sizes; carefully prepared bituminous coal of the kind commonly sold in the West and South; coke specially prepared for domestic use either in byproduct ovens or by some process of low-temperature carbonization. Manufactured gas or fuel oil may appeal to some householders, but the prospect for producing either of them at prices that will be attractive is not reassuring. House heating by electricity is not within the realm of practical affairs, as is quite evident if the thermal efficiency of good house furnaces is compared with that of the generating station. It would take five times as much coal at the station to generate the current required as to generate the heat at home. Whatever may be possible in the Far West, where there is surplus water power, the conditions in the anthracite-burning region are such that the current from any hydro-electric plant would cost perhaps three times as much as the coal used in the house furnace.

The engineers of the commission are convinced that with sufficiently active demand the manufacture of briquets and of coke can be so improved as to yield increasingly large amounts of supplementary fuel. The problem is one of salesmanship, public education and intelligent choice by the consumer.

A responsibility for extension education in fuel economy rests upon our research organizations and universities. They have devoted much attention to combustion economy in the operation of power plants. It is now in order to turn attention to economy in household heating. The chief need is to make available to the home owner the simple facts about what to burn and how to burn it. Responsibility also rests upon the retail coal dealer to spread the knowledge and use of supplementary fuels. The commission commends to retail coal associations the subject of showing people how to cut fuel bills. This is salesmanship of a high order and will return a dividend in increased business and in a larger measure of public confidence not always now accorded to the retailer. State and local fuel committees and local chambers of commerce may play an important rôle in extending the use of supplementary fuels and in furnishing practical advice to any householder who is considering a substitute.

The chief responsibility, however, rests upon the householder himself. The inertia of habit has played into the hands of the producer and the dealer and helped to create a perpetual "seller's market." *The householders of New England and the Northeast while rightly asking for relief against the menace of an interruption of the coal supply, should realize their collective power to influence prices.* The most paternal of governments cannot relieve the individual from the consequence of his own negligence. There rests upon the householder the responsibility of buying coal when coal is to be had and also the responsibility of casting about for supplementary fuel.

One of the immediate causes of the distress in the Northeast last winter was the hesitation of householders to accept substitutes until cold weather was upon them and anthracite was literally not to be had. The consumer can create a demand for supplementary fuels that will both increase the supply and lower the price. Under present levels of price the Commission is convinced that many householders by a little attention to the subject can materially reduce their coal bills. Those who cannot burn coke or bituminous coal outright can frequently use a mixture of coke and pea coal or a mixture of the steam and the larger sizes of anthracite.

Building up the demand for substitute fuels is one form of insurance against combinations of labor or of capital and the consequent rising prices.

Review of Industrial Relations

Civil Rights.—The subject of the breach of civil rights, resulting in a general cessation of labor in all those fields where contracts have been made with the United Mine Workers of America, must be left for analytical presentation to the final report, since it involves the bituminous as well as the anthracite fields. But as these strikes or lockouts, whatever they may be, have affected the anthracite industry as well as the bituminous industry, a general reference to the situation is not inopportune.

The principles that a man has a legal right to work free and unimpeded by threats, duress, coercion or restraint, when, where and for whomsoever he chooses; that a man has a legal right to employ and discharge as he pleases, and that men have a right to bind themselves together for collective bargaining touching wages and working conditions are freely admitted by everyone. These principles honestly lived up to would keep the open shop and at the same time permit the existence of the union. But as a matter of fact, the open shop in a unionized mine is open to the union miner and closed to the non-union miner, while the open shop in the non-union mine is open to everybody save a United Mine Worker. No opinion will now be expressed as to whether this condition has arisen from an attempt to unionize the mine and not the miner.

Without attempting to trace to its origin the first violation of the law to fix the primary responsibility for breaches of the law and starting the trouble, it will be sufficient to say that no side, whether union or non-union, can show absolutely clean hands in keeping and helping to enforce the civil rights of American citizens. These breaches of the law have doubtless arisen upon the theory that vast aggregations of capital and vast aggregations of labor have just the same rights as the individual, but the Commission believes that the innocent bystander has some rights which both of these contending forces are bound to respect. Corporations, whether *de facto* or *de jure*, are not individuals, and they may not exercise unrestrained the natural rights of man. If, as the Commission believes, the mining of coal is clothed with a public interest, then both sides must—peaceably and voluntarily if they will and under compulsion if they will not—deal with each other in the light of the general welfare of the American people; and while the Commission believes there is ample authority to punish a conspiracy of either operators or miners, or both, directed against the general welfare of the people, if there be not such legal authority, it will be recommended for enactment in the Commission's final report.

We shall not attempt to give a list of button strikes or other strikes called for the real or alleged purpose of rectifying grievances under the existing contract. The anthracite mines are theoretically open mines. It is not the public's concern but the union's business whether a man pays his dues to the union or not, yet if he does not pay his dues and wear his button in proof thereof, a strike takes place and is not usually settled until he has paid his dues. By the existing contract a settlement of disputed questions of fact arising under its terms is provided for the very purpose of obviating strikes, yet strikes have occurred over these facts. They have not taken place at the instance of the general or district officials of the United Mine Workers; nevertheless they have occurred.

It is not possible to determine the motive in the mind of each man who votes for a strike, whether it is economic or political, but it is fair to assume that the vast majority of the violations of agreement not to strike have been by those who were interested in the purely economic situation. Men in America have economic rights for which they are justified in contending and they have political views which they are authorized to advocate. But they have no right to pretend they are contending for economic rights if their aims are purely political. Political questions should be settled by American citizens, and economic questions by individuals, corporations and labor organizations. An alien has as much right as an American citizen to strike for wages and working conditions and as such has a right to join with American citizens; but it is to the interest of the Republic that aliens should seek citizenship.

Persons, firms and corporations doing business under the protection of the laws of this land owe it to be diligent in their efforts to educate and naturalize the aliens whom they employ and for whose presence here they have been in too many cases responsible. It appears that less than one-half of the 78,000 foreign-born miners have sought citizenship, notwithstanding 68,000 of them have been in this country

over ten years. A rebirth of the American idea is needed in the anthracite region, and great care should be exercised to differentiate on questions which may lead to a strike as to whether they are economic or political in their nature. The alien should be permitted to exercise every economic right of an American citizen, but no political right until through naturalization he assumes allegiance to this country.

Strikes have occurred in violation of the agreements entered into not to strike, but fairness compels the statement that there has been justification for some of them in human nature arising over delays in investigating complaints and insufficient personnel to accomplish speedy results.

Neither individuals nor aggregations have the right to make a contract and ignore its obligations, and collective bargaining implies collective keeping of the bargain. In the anthracite region the union has won its fight for collective bargaining and now exercises a practical monopoly. The union must justify itself. If it cannot furnish wise leadership and assist in the efficient conduct of this industry, punish the wrongdoings of its own members as freely as it demands the punishment of wrong at the hands of the operators, it will not justify its existence.

Similarly, by making use of the experience in other industries and the best in their own industry, the operators have an opportunity to concentrate on the human problem of men at work. The best standards of general industrial practice imply continuous cultivation of good relations between the employer and his employees, by organized efforts to build up industrial good-will and by the selection and training of foremen and other employees. Organized efforts to promote such contact would tend to correct the sad effects of contacts based chiefly on grievances, and, needless to say, this would weaken the forces making for strife by strengthening the normal co-operative motives. Industrial practice has demonstrated that the best results are to be obtained where executive responsibility for personnel and labor matters is concentrated in one responsible executive whose attention is devoted chiefly to them.

Pending Negotiations.—Just now, when in accordance with the agreement made between the anthracite operators and the United Mine Workers of America, a new contract is to be entered into in the light of the recommendations of this Commission, it calls attention to certain facts, not to stir up a controversy about them but in the hope that a general amnesty may be declared in the industry, the slate wiped clean, and negotiations had looking toward justice to both miner and operator and a continuous and uninterrupted supply to the users of anthracite.

There is no adequate provision for the consideration of specific disputes at the mine nor for insuring that all employers handle the question the same way. The union participates by its district representatives, but the employers have no corresponding agent to represent them in the early stages of the disputes. In this particular this industry is not abreast of other well-organized industries. The Conciliation Board has done valuable work since it was created, in 1903, but as the years have gone by it has lost some of its effectiveness; and partly through its own fault.

Recommendations. — (1) *The Commission recommends that in the next agreement there should be a provision for a continuing umpire and that he or an assistant named by him should sit with the Conciliation Board at all its meetings, but without a vote.*

(2) *In view of the delays that have been caused by the absence of members of the Conciliation Board, alternates of like standing in the industry should be selected with authority to act in the absence of the original member.*

(3) *The operators' group should appoint a full-time representative and all necessary assistants to consider jointly at the mine with the district officers of the union each case before it is appealed to the Conciliation Board in the hope of securing a local agreement, arriving at a better understanding by each side of the difficulties and problems of the other, and thus producing a mutual feeling of respect for the other's opinions and each obtaining the outlook of the other upon the problems.*

(4) *So many changes have taken place since 1903 that the agreement should provide for a joint committee to work out a restatement of the whole agreement in the terms of today, and this agreement should be specific enough to be the code by which all persons having anything to do with the settlement of grievances shall be bound.*

(5) *If the Board of Conciliation does not clearly understand the facts involved in any case, it should appoint an examiner from each side immediately to investigate and furnish it with all the facts.*

(6) *The agreement should provide for penalties for the breach thereof by either party, and the method by which such penalties are to be enforced.*

(7) *The renewed agreements have too rigidly retained the practices and conditions of 1902 and have not had adequate flexibility. An industry which is necessarily constantly changing cannot tie itself inflexibly to conditions of twenty years ago without hampering the management and working injustice to miners. A second joint committee should be provided for in the next agreement and directed to make an engineering study of the elements of the job of mining anthracite coal, for the purpose of building up a scientific and more equitable basis for rate making. Until, however, such committee shall disclose fundamental facts which shall form a decidedly better basis, the old 1903 base should, of course, be retained, for however inequitable the basis of 1903 with its subsequent modifications is, it is better than no basis at all.*

(8) *The expiration of the contract in the anthracite region should not coincide with the expiration of that in the bituminous region. The contract should run for a definite period of time with the proviso that it shall be deemed to be renewed for a like period of time except as to such provisions thereof in which notice of a desired change shall have been given by either party to the other at least ninety days before the renewal date. Upon these proposed changes the parties shall immediately confer and if, sixty days before the date fixed for the renewal of the contract, they have been unable to agree, they shall report such fact to the President of the United States, specifying clearly the controverted points. The President shall thereupon appoint a person or persons to inquire into and make public a report upon all the relevant facts in controversy before the date of such renewal shall have arrived.*

The Commission recommends at this time no punitive legislation. It awaits with interest whether the next agreement entered into shall show a co-operative spirit, a clear idea of partnership on the part of all concerned in it, and a proper conception of the rights of the American people. These rights in the anthracite region are no different from those in the bituminous, and the judgment of the Commission will be very largely affected by what takes place in the present negotiations. It calls attention to the fact, however, that some of the material from both the operators and the United Mine Workers presented to it is calculated even if not intended to inflame the public mind for or against one of the parties. This is more applicable to the bituminous controversy.

These charges and counter-charges are most unfortunate at this period of negotiations. Instead of preparing the public mind as to what will be real justice to the operator and the miner and what will stabilize the industry, there has been too much of epithet, too little of argument. The Commission recommends that each side forget past differences and grievances and attack the problem in the spirit of justice and fair dealing, not only between themselves but with due regard for the rights and sensibilities of the American people. The Commission hopes that a constructive view will be taken, not controversial in its character, so as to assure a continuous output from the anthracite mines and the scrupulous keeping of the agreement. If it must fix responsibility because the old order has not changed, it cannot do so without taking into consideration the bituminous industry.

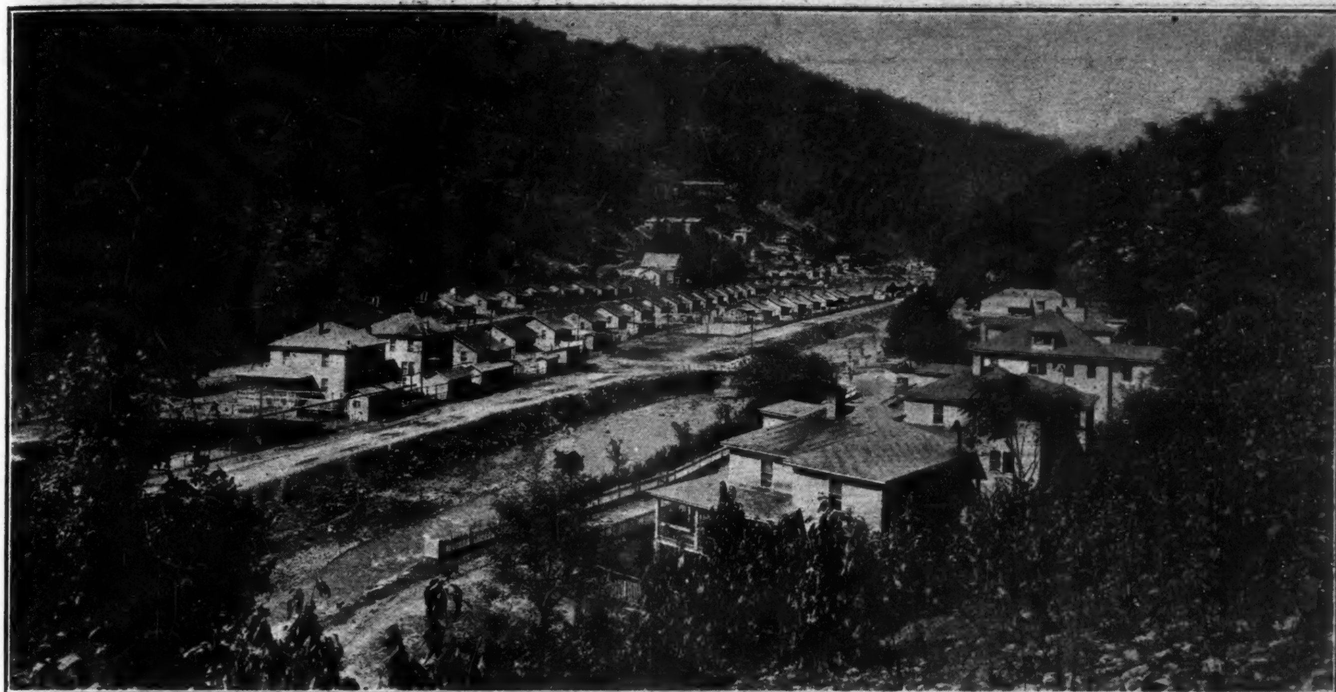
In conclusion the Commission invites attention to the specific recommendations contained in this report on the following subjects:

(1) Government regulation.
(2) Publicity of accounts.
(3) Authorization of President to declare national emergency.
(4) Uniform standard ton.
(5) Re-examination of anthracite freight rates by Interstate Commerce Commission.
(6) Reduction in number of sizes.
(7) Inspection of quality.
(8) Larger use of substitute and supplementary fuel.
(9) Excessive hours.
(10) Readjustment of wages of miners' laborers and of the conditions of their employment.
(11) Readjustment of royalties.
(12) Power to punish conspiracy against general welfare.
(13) Personnel manager.
(14) Assimilation of aliens.
(15) Alternates for members of Conciliation Board.
(16) Continuing umpire.
(17) Examiners for Conciliation Board.
(18) Full-time representative of operators.
(19) Joint committee to prepare industrial code.
(20) Joint committee to secure scientific analysis of jobs.
(21) Penalties for breach of agreement.

Respectfully submitted,

JOHN HAYS HAMMOND, Chairman.
THOMAS R. MARSHALL,
CLARK HOWELL,
GEORGE OTIS SMITH,
EDWARD T. DEVINE,
CHARLES P. NEILL.

Attest:
EDWARD EYRE HUNT,
Secretary.



Where to Build Our Mining Towns and What Type of House We Should Erect in Them*

Build in the Creek Bottoms and Straighten Out and Deepen Creek for Safety, Space Economy and Sanitation—Keep Houses Near Mine—If Necessary to Restrict Town Area, Erect Apartments

By Thomas F. Downing, Jr.
General manager, Logan County Coal Corporation, Lundale, W. Va.

In a large area of West Virginia and Kentucky many of the mines are small because the companies lack space on which to build large towns and make the necessary improvements. They often have nothing but a little bottom land cut up by the streams and ravaged at times of high water.

The question arises whether they are using to the best advantage all the bottom or level land they have. Where the mountains are steep and the valleys narrow the streams are subject to sudden increases in volume. In most cases the bed of the creek is shallow and when the stream rises suddenly it spreads out over a large part of the bottom land.

When the floods are unusually high the stream often does many thousands of dollars' worth of damage to property, and so completely deprives many of the inhabitants of their peace of mind that they move away to places where such hazards do not exist. At such times of high water the creek usually changes its course and, in doing so, often carries away some of the land that was considered high and safe. It is obvious, therefore, that if the investments of mining companies in such places are to be protected, if communities are to be permanently established and if a maximum tonnage is to be produced, the bed of the stream must be so modified that the water will be controlled at its flood stages.

What is the best, most economical and lasting method of doing this? In my opinion the most practical and economical way is to dredge the creek with steam shovels. An original expenditure of about $3 per lineal foot is about all that is necessary under the conditions to carry approximately three million gallons per minute at a velocity of from 15 to 17 ft. per second. This cost includes the leveling of the spoil.

In 1917 our companies† and those working adjacent properties lost several buildings and decided to try to protect the properties by dredging. Several of the neighboring companies entered into the project with us and we dredged approximately nine miles, at the same time making about seven miles of roadbed above the water level and four miles of railroad grade. Sufficient material was procured from the creek to level and grade part of the house sites. Bids were called for, but the contractors were afraid of floods, and consequently the bids were too high to receive consideration. Three 60-ton shovels were rented with specially constructed booms for excavation, and three smaller shovels were leased to take care of the spoil. The project was attacked at three different points, the work being continued through the winter of 1917 and being completed in 1918.

The winter work added greatly to the cost, and I would not advise anyone to do this work in the winter if that can be avoided. I also would not advise dredg-

*Article entitled "Where to Build Our Mining Towns and How to Build Them," read before the summer meeting of the West Virginia Coal Mining Institute at Clarksburg, W. Va.

Note—Headpiece shows channel excavated at Lundale, W. Va., and the double line of houses which the dredging of the creek made feasible. This picture was taken four years after the work was completed. The stream formerly meandered all over the bottom, leaving no room for houses. Observe the fine public road which parallels the stream.

†Lundale Coal Co. and Three Forks Coal Co.—Editor.

RECLAIMING THE CREEK BOTTOM NEAR LUNDALE BY DEEPENING THE CHANNEL WITH

In this section of the work the channel was carried up the center of the bottom, as houses already had been constructed, thus preventing the choice of the foot of the hill as a location. The two shovels are side by side so that the spoil is put into position as fast as it is cast up into the heap. Thus if a flood comes no risk of having the material washed back into the channel need be faced. It is clear that the houses that line the creek are occupying the flood channel of the stream. Until the creek was dredged, times of high water were discommoding even when not actually perilous. Furthermore, the lowering of the stream bed improved sanitary conditions by providing good drainage either through the soil or through pipes. Stream rectification

ing unless the small shovel goes along with the big shovel, the first disposing of the spoil as fast as the latter excavates it. In one of the sections a small shovel could not be procured and in order to get the section completed before the high water came the bed of the stream was dredged a distance of about 3,000 ft., the material being placed on the side of the creek.

The flood came and washed all this spoil back into the creek, and it had to be dredged out all over again. The shovel was covered half way up the boiler, and it had to be dug out by hand. In another instance the flood turned over the large shovel and cut the bank from under the small shovel, letting it drop into the stream with the big shovel. All the expense connected with these unfortunate occurrences or with our lack of foresight—call it what you may—is included in the cost given later.

Suitable labor could not be obtained for this work, and the contractor from whom the equipment was rented was allowed a few cents per cubic yard excavated, in return for which he was required to keep a full crew on the job at all times. The rental was $500 per month each of the 60-ton shovels and $350 per month for the smaller shovels, the lessee to keep up the shovels while using them and paying the freight to and from the job.

Table I shows the cost per cubic yard under different classifications.

This dredging was completed during the early part of 1918. During the excavation period more water passed through the completed channel sections than in the making of the estimates had been anticipated as a maximum. No damage has been sustained from flood or high water since the work was completed, and hundreds of houses have been built in places which would not have been safe for such buildings prior to the dredging.

This particular job has shown us that the cross-section of the creek can be three-fourths of what it was before dredging and still allow a safety factor of from 15 to 20 per cent. The velocity of the stream was increased at one point from 10 ft. per second before dredging to 17 ft. per second after dredging.

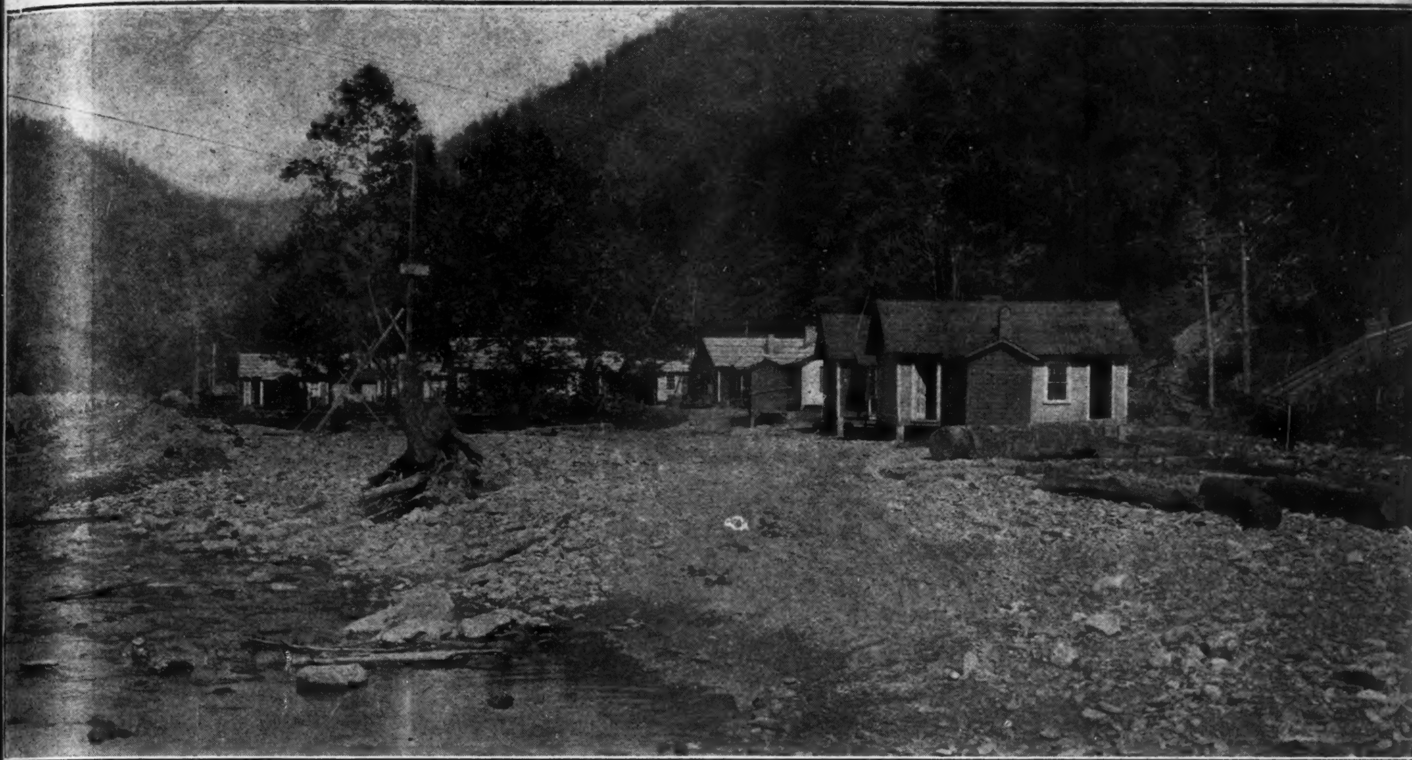
In laying out a dredging project it is advisable to keep the creek as near the mountainside as possible, as this allows the recovery of a maximum area of ground. The channel should be kept as straight as can be arranged and where curves are necessary a slightly greater cross-section area should be afforded. It will be found that there will be little cutting of the bank except on curves. Where these occur they should be protected in some manner.

If the bottom of the channel is near solid rock the best protection, of course, is a wall. It is not safe, however, to build such a structure unless it rests on solid rock, for the greater part of the water will run along the wall and in time will undermine it. Where solid rock is to be found only at a considerable distance under

TABLE I—COST OF EXCAVATION OF CHANNEL PER CUBIC YARD AND PER LINEAL FOOT

Freight	$0.0071
Erecting and dismantling shovels	0.0061
Moving to and from location	0.0133
Rental on shovels	0.0579
Drainage	0.0022
Shovel repairs	0.0286
Flood excavation	0.0058
Shovel excavation (labor)	0.1108
Grading and spoiling (labor)	0.0651
Supplies	0.0188
Contractor's estimate	0.0390
Total cost per cubic yard	0.3547
Number of cubic yards excavated	403,615
Number of lineal feet excavated	48,225
Number of days the shovel worked	718
Number of cubic yards per working day	562.1
Number of cubic yards per foot dredged	8.37
Cost per lineal foot	$2.969

The number of days worked represents the sum of the actual working days of the three big shovels.



A 60-TON SHOVEL AND SPREADING THE SPOIL WITH A SMALLER MACHINE

and deepening is a problem which most operators in mountainous regions have to face. The difficulty is as perplexing in Utah as in West Virginia and Kentucky with the exception that in the first-mentioned state conditions seem perfectly safe and improvement a flagrant waste of money until a cloudburst comes and what was a mere trickle of water is converted in a few minutes into a raging torrent the full width of the valley and capable of carrying everything before it. In many cases where streams pass over coal mines the formation of a better stream bed by dredging will save the workings from much water and make possible the excavation of the coal over a larger area. It should not be delayed till flooding makes it necessary.

the floor of the channel the curve should be protected by large loose rock. This rock presents just as much friction as any other part of the bed and when undermined merely sinks deeper, affording still better protection.

With a Little Work Channel Will Deepen

After the job is completed the channel, given proper care, will continue to deepen. Every wet season washes dirt from the channel and exposes new boulders. If these are not renewed the channel probably will fill up in the next wet season, but if a few men are put to work in the channel in the summer throwing out these boulders, the stream under most conditions will continue to cut deeper. The rock thus removed should be thrown to the foot of the bank, thus forming a better protection from cutting. While the actual dredging is going on the shovel should put all convenient large rock at or near the foot of the slope.

In some places the channels have cut 3 to 4 ft. but at other places only about one foot. The least cutting usually is found just after leaving a bad curve, where the velocity of the stream is reduced.

Aside from its advantages from the viewpoints of safety and reclamation, dredging has been of inestimable value to us from a sanitary standpoint. The bed of the creek is now enough below all of our houses to make it easy to run our sewers into it. It is so much lower than the surrounding land that the water seeps through to the creek, and contagious diseases have been practically unknown in our camps since dredging was completed.

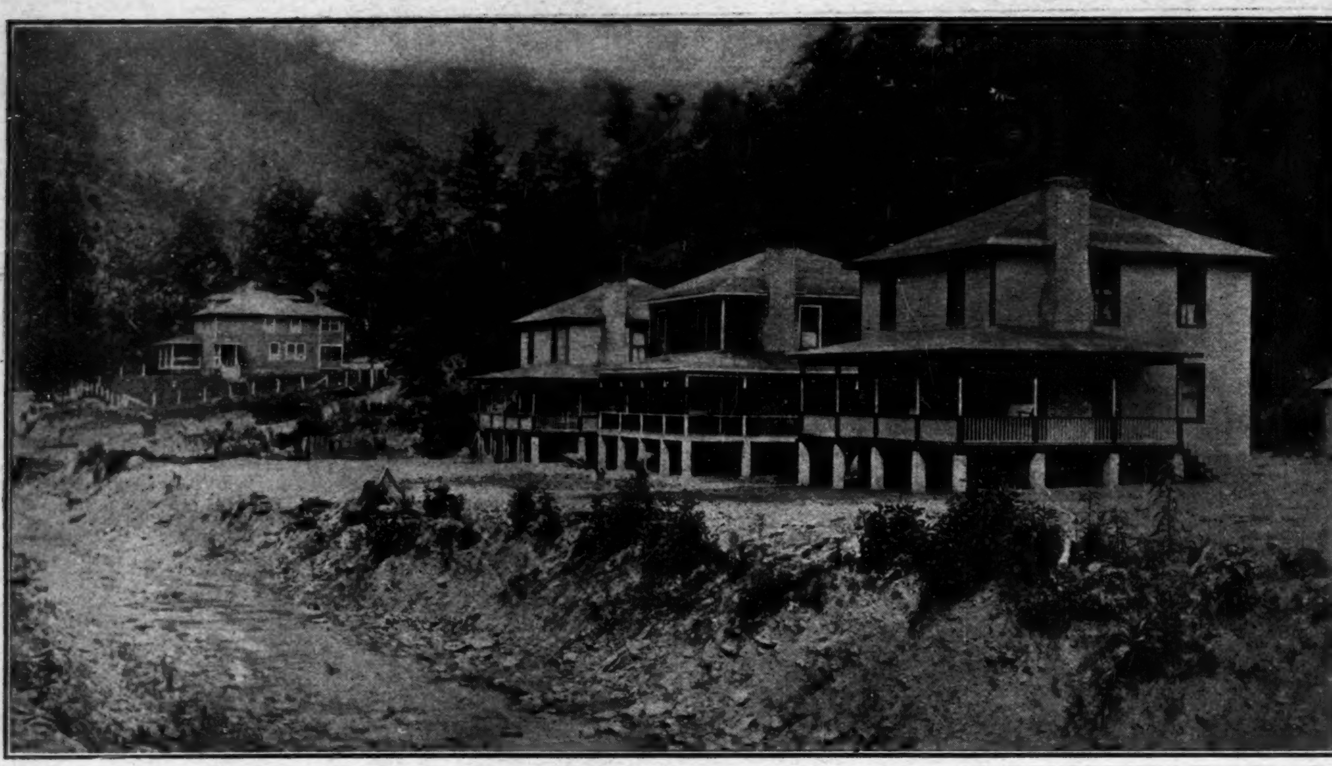
The material removed by the dredging consists principally of sand and gravel. This material is excellent for road-making purposes as it drains well. Where we formerly crossed through the main creek fifteen times in going from one mine to another, a distance of five miles, we now have a good county dirt road above water level at all seasons and we have had to build only two short bridges.

After the ground is made safe and prepared for the town comes the question as to the kind of construction to be employed. What it should be depends largely on two conditions: How much can justifiably be spent on the town and how long will the plant last? The plan is influenced also in some measure by the proximity of the mine village to a larger and well-developed town and by many other features which are peculiar to the particular territory under consideration.

Before any construction is commenced it is important that the location be cleared and properly graded. This will add much to the appearance of the town and will be much less expensive than if an attempt is made to do it after the houses are built. After people move into the houses it will not be necessary to annoy them by the blasting of stumps and rock and, furthermore, water cannot collect in stagnant pools to breed disease.

Much has been written on the detail of construction and architecture, and I will not dwell on that subject but merely state that no matter what you are going to build it would be well to keep in mind the fact that American standards of living are continually becoming higher and your construction should reflect that fact.

We must watch lest we build too far away from the mine if we are to receive the maximum efficiency from our dwellings. I have found that a house which is built a mile away from the mine mouth is only about half as efficient as a house which is built nearby. I have found that in the winter it is difficult to keep tenants in the more distant houses, and that all of them want to live near the drift mouth so that the men will be close to their work in bad weather and their families



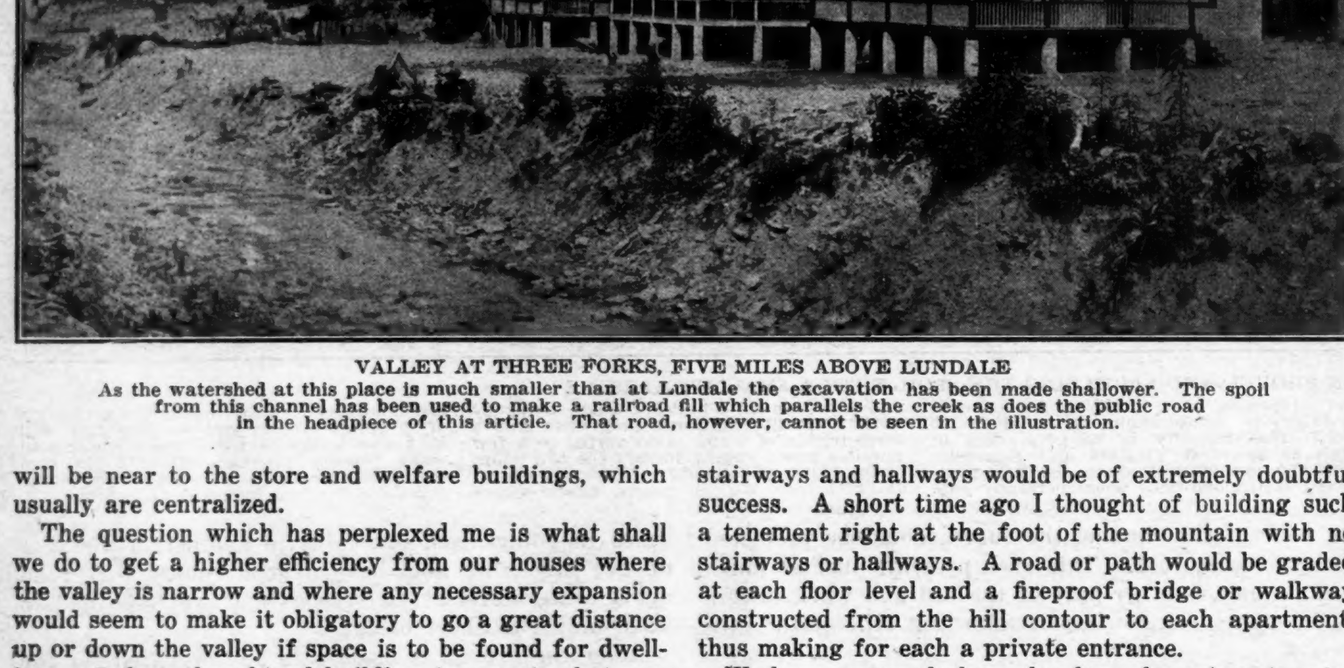
VALLEY AT THREE FORKS, FIVE MILES ABOVE LUNDALE

As the watershed at this place is much smaller than at Lundale the excavation has been made shallower. The spoil from this channel has been used to make a railroad fill which parallels the creek as does the public road in the headpiece of this article. That road, however, cannot be seen in the illustration.

will be near to the store and welfare buildings, which usually are centralized.

The question which has perplexed me is what shall we do to get a higher efficiency from our houses where the valley is narrow and where any necessary expansion would seem to make it obligatory to go a great distance up or down the valley if space is to be found for dwellings. I first thought of building tenements, but our people are so mixed that the housing of a number of families with a common entrance and with common stairways and hallways would be of extremely doubtful success. A short time ago I thought of building such a tenement right at the foot of the mountain with no stairways or hallways. A road or path would be graded at each floor level and a fireproof bridge or walkway constructed from the hill contour to each apartment, thus making for each a private entrance.

We have prepared plans also for a four-story twenty-apartment house to be constructed of steel, tile and concrete and fireproof throughout. We would install



SECTION OF APARTMENT HOUSE DESIGNED FOR A MINING TOWN

Where the level ground is limited and people, not having trolley facilities for reaching the mine, the store, the church, the movie show or the dance hall, must travel long distances afoot, the proposal has been that mine villages be provided with fireproof apartment houses having modern conveniences. Where the company supplies coal for a small given charge per month (usually at a wholly inadequate figure) the apartment house will save fuel and reduce this loss. The apartment suggested is to be four stories high. It is believed that the cost of this large building will be about the same as that of a number of smaller dwellings that will house an equal number of families, but it will take less space and provide greater comfort.

steam heat, cold water and connections for hot water with hot-water tanks, lavatories and shower baths. I show herewith a plan giving the details of the arrangement and the size of rooms together with location of chimneys, bath, etc. You will note that one chimney from the ground up will serve eight kitchen stoves. The plumbing is so arranged that one coil of pipe will serve eight families.

We have not gone far enough to obtain an exact cost on such a building but from what information I can gather it should cost between $45,000 and $48,000. I think it is practically necessary to make such a building four stories high, for only by that means can it be built at a cost comparatively little greater than would be incurred in building separate structures to house the same number of families.

A large saving on insurance and coal would be effected. In mining towns employees usually are charged $1 per month for all the coal they wish to burn. When houses are equipped with grates the company loses much money on the coal furnished. Under this arrangement much of the cost would be saved, for a centralized heating plant would be provided. The building proposed would give the people all the conveniences possible and for twenty families it would occupy about the area that two single houses would require.

In discussing this proposition among the members of our organization it was pointed out that the people living in such a building would have no gardens. We therefore made a canvass of our largest town and found that only 46 per cent of the people who could have gardens really had them. It is, of course, not the idea to build the entire town along these construction lines, but only to take care of the tenements necessary after the town has been built up in the usual manner within an economical distance from the plant.

Southwestern Operators Launch Campaign in Newspapers to Educate Public

United as "The Associated Coal Bureau of Kansas City," operators, jobbers, wholesalers and retailers of Kansas City have instituted an intensive advertising campaign in an endeavor to bolster the midsummer domestic market. The bureau carries advertisements of from one-fourth to one-third page in one of the Kansas City newspapers, explaining something of the hazards of the coal business and the factors which determine the retail price.

As a sample of the type of matter employed, soon after the submission of the report of the Southwestern Interstate Coal Operators' Association to the U. S. Coal Commission, the bureau had reprinted in its "ad" a facsmile of Washington press dispatch to the *Kansas City Star* summarizing the association's statement.

By the side of the facsimile appeared the bureau's comment: "This clipping, which is a résumé of the report of the Southwestern Interstate Coal Operators' Association, shows the coal problem as it now presents itself to the producer in this territory. It explains the 'why' of increased coal production costs and demonstrates the reason why you cannot expect lower coal prices in the near future. Many of the troubles cited are peculiar to this Southwestern territory—some are nation-wide in their scope—yet all are facts with which coal users should be acquainted. . . ."

The campaign has not yet lasted long enough to determine what effect it will have upon the local market, but it has the support of most of the coal men of Kansas City.

Coal Prospectors Busy in Wyoming; Leasing Active in Utah

Up to June 1 a total of 419 coal-prospecting permits had been issued by the Department of the Interior on public lands of the United States. Coal prospecting is most active in Wyoming, where 103 permits had been granted. Colorado, with 90 prospecting permits, was second in this respect; Montana, with 51 permits, was third; Utah, with 39, fourth; and Nevada, with 34, fifth. Thirty permits had been issued in New Mexico, 25 in Oregon, and 21 in Washington. Of the 78 leases of coal-mining operations, the largest number, 26, is in Utah. Sixteen leases have been granted in Colorado, 12 in Wyoming, 10 in North Dakota, and 9 in Montana.

A total of 980,000 acres of coal lands in 15 Western states have been leased for mining operations, and this acreage is increasing rapidly. These figures do not include the Territory of Alaska, where operations are conducted under a different system.

Coal is now being mined from government land in Washington, Montana, North Dakota, South Dakota, Wyoming, Utah, Colorado, and New Mexico. During 1922 a total of 101 mines produced coal on leased public lands.

Technical supervision of these coal-mining operations, with special regard to maintaining maximum standards of safety and efficiency, is directed through a mining supervisor of the engineering staff of the Department of the Interior.

In the past, because of the prior development of mines and industries in the Eastern states, coal mining on the Western public domain has been overshadowed by private industry; in the years ahead the leased mines may well become the more important. Every effort is accordingly being made by the Interior Department to establish the new system on a sound basis, to protect the public interest in safe and efficient mining, and not unduly to hamper initiative in operation.

French Coal Output and Consumption

The fuel consumption of France in April (and the first four months of this year) was as follows, in metric tons:

	In April, 1923	First 4 Months of 1923
COAL		
Output	2,999,617	11,637,998
Imports	1,926,563	7,598,514
	4,926,180	19,236,512
Exports	96,675	807,439
Consumption	4,829,505	18,429,073
COKE		
Production of collieries' coke ovens	156,035	558,996
Imports	243,989	939,155
	400,024	1,498,151
Exports	21,298	109,521
Consumption	378,726	1,388,630
PATENT FUEL		
Production of briquets works attached To collieries	214,342	994,502
Imports	44,648	248,052
	258,990	1,242,554
Exports	27,412	103,632
Consumption	231,578	1,138,922

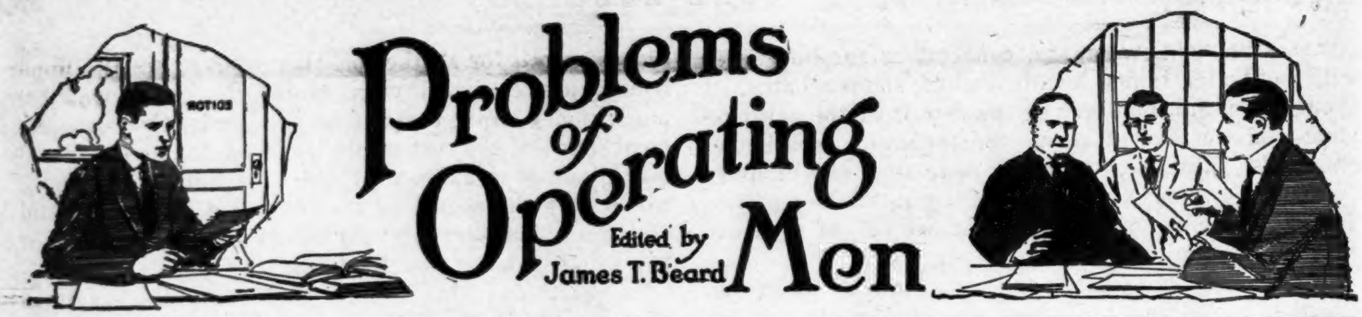
In order to arrive at the exact figure for total French consumption, the quantities transformed into coke and briquets should, of course, be deducted from the coal output.

The Office des Houillères Sinistrées (French distributing agency for indemnity coals) has received from German occupied territories the following fuel, in metric tons:

	Coal	Coke	Lignite Briquet
In April	62,900	131,000	3,400
From May 1 to May 28, inclusive	110,400	159,900	4,400

According to another source there was forwarded from Germany to France and Luxemburg (the above figures apply only to France) during the whole month of May 137,700 metric tons of coal, 193,000 metric tons of coke and 10,000 metric tons of lignite briquets.

During the first week of June 37,275 metric tons of American coke arrived at Dunkirk, as against 25,600 metric tons during the preceding week.



Working a Double Seam of Coal

Experience in Working Coal Seams with Forty Inch Slate Parting Shows Advantage in Use of Jeffrey Arcwall Mining Machines

WHILE employed as superintendent of mines for the Consolidation Coal Co., at Jenkins, Ky., I had several sections, in Mine 204, where the conditions were similar to those described in the inquiry that appeared in *Coal Age*, May 10, p. 762.

The inquiry comes from a superintendent at Staub, Ky., and asks for the cheapest and safest manner to work a double seam of coal with a view to obtaining a maximum extraction of coal, at a minimum expense for deadwork.

The inquirer states that his bottom seam, a bench 52 in. in thickness, is separated from the top seam by 30 in. of slate parting, which is of such a nature that it cannot be held up for any length of time. The upper seam is coal of good quality and 30 in. thick. In the Jenkins mine I have mentioned, the parting slate ran up to 40 in. in thickness and the method of extraction I am about to describe proved very successful.

Under the conditions mentioned in the inquiry, I would suggest driving all entries 12 ft. wide and turning rooms on 50-ft. centers and widening to 20 ft., leaving 30-ft. pillars between the rooms. My experience has taught me that advantage is gained by the use of the Jeffrey arcwall mining machine.

Mining in the Slate Saves Coal

If the slate parting is sufficiently soft, as I believe is the case in this instance, the cutting should be made in the slate just on top of the lower bench of coal, as this will save 5 in. of coal being reduced to bug dust.

At Jenkins, we succeeded in cutting from 75 to 80 per cent of the places in the slate parting. The only places cut in the coal were those where the parting was so hard that the bits on the machine would not stand up to the work. Also, the hard cutting caused an excessive heating of the armature of the machine, particularly if the parting was of a flinty nature.

In my opinion, loading out all of the slate when driving the entries proved a hundredfold saving, by keeping good clean haulage roads, which always means increased production and reduced cost. Gobbing the slate at the side of the track generally resulted in more or less of it slipping down on the track and reducing the efficiency of the haulage, which is the most important factor in coal-mining operation.

From the statement regarding the soft condition of the parting in this case, I would not consider it to be safe for men to work any distance under the slate. If it did not fall readily, I would blast it down and work out the full height to the sandrock roof, with each cut made in the face.

However, all the coal of the lower bench should be loaded out before the slate is allowed to fall. For that purpose, it should be well timbered till the lower coal has been loaded out. The posts are then drawn and the slate allowed to fall or blasted down. In the rooms, the slate should be gobbed on the side of the track opposite to the pillar that is to be extracted.

To my mind, this is the most practical way to work a seam of this kind where the slate parting is too soft for a permanent roof, and the upper bench of coal is of such quality and thickness as will justify the handling of the rock separating the two seams.

J. W. Powell,
Charleston, W. Va. General Rock Contractor.

ANOTHER LETTER

IN LOOKING through the issue of *Coal Age* for May 10, I became interested in a letter of an inquirer (p. 762) regarding the working of a double seam of coal containing a slate parting 30 in. in thickness. The inquirer wanted to know the cheapest method of mining these two seams, in respect to the handling of the large amount of waste.

In my opinion, the only practical method to adopt, in this case, would be to drive the rooms with the road close to the straight rib. The rooms should be turned 8 ft. wide and driven a distance of 10 yd. before widening out to a width of 24 ft. In doing this work, the stone should be loaded out; but, after widening the room, there will be plenty of room to gob the stone.

Disposal of Waste Important Factor

Thirty inches of stone is a large amount of material to handle with due regard to economy of operation. It is not practical to consider loading this waste into cars and hauling it out of the mine, as that would largely increase the cost of production and eventually close the mine by putting it on a non-paying basis.

It is of the utmost importance, therefore, to stow the slate at the nearest available point and avoid the expense of hauling it out of the mine. The inquirer has stated that the nature of the slate is such that it cannot be supported for any length of time, which makes it necessary to consider how it can be handled to the best advantage. For that reason I would work these two seams as one.

By following this plan, all the coal, both top and bottom, will be taken out as the room is driven up. I would cut the face with a shortwall machine, loading out the bottom coal, then dropping the stone and stowing it in the waste, before taking down the top coal. This plan eliminates the danger of working under the stone, as stated in the reply to this inquiry.

———, Pa. Alexander Denholm.

Extracting Coal in a 30-Ft. Seam

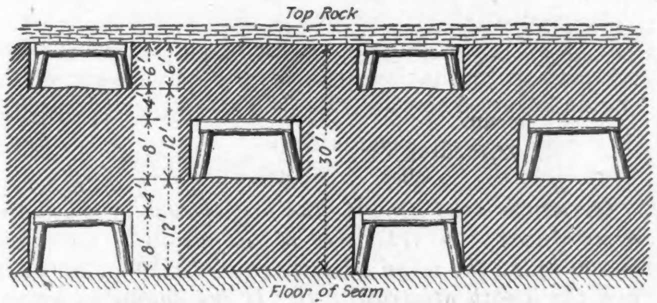
Seam divided into three measures—Headings not driven vertically over those in seam below—Extraction in each lower seam kept in advance of that above.

SOME time ago I noticed, in the Inquiry Department of *Coal Age*, a request for the most suitable method of working a 30-ft. coal seam. If I remember rightly, the inquiry came from a mine in Utah or Colorado. At that time, I was unable to offer the suggestion I had in mind; but, though late, the following brief outline may be of interest.

Without referring to the question of the depth of the seam below the surface (I do not recall that mention was made of that matter in the inquiry), my plan would be to divide this thick seam into three measures, with respect to the extraction of the coal. For example, making the two lower measures 12 ft. in thickness will leave the upper measure 6 ft. thick, which will afford a good opportunity for timbering the overburden.

How the Work Is Started and Conducted

Work should be started by driving the main headings on the slope of the seam, if any, keeping these well in advance of the headings above. In the accompanying



SHOWING GENERAL ARRANGEMENT OF HEADINGS

figure, I have shown a general cross-section of the main headings in the several measures. It will be observed that these headings do not lie vertically, one over the other, but alternate in the different measures.

The arrangement offers a good support to the floor of each heading and has the effect of overarching the weight. The same general plan is followed in driving the butt headings to the right and left of the main slopes or entries. These butt headings are driven in pairs on, say 300-ft. centers. The rooms or chambers are driven 15 ft. wide, on 24-ft. centers and follow the same alternating plan with respect to the chambers in the next overlying measure.

When all the headings have been driven to the limit and the chambers likewise, in the several measures, the work of robbing the pillars is first begun in the lowermost measure, the robbing advancing about 10 yd. ahead of similar work in the measure above. If properly conducted, this method will not require the use of much timber, except in the uppermost section or measure. I should have stated that all entries or chambers are driven 8 ft. in height, leaving 4 ft. of coal between the measures, as indicated in the figure.

Parnassus, Pa. C. W. Atkins.

[The correspondent has not made clear, in the method he has outlined, regarding the work of robbing, which he states is started first in the lowermost section and kept some 10 yd. in advance of similar work in overlying sections. The question of support for the upper measures, as the robbing progresses below would appear to be a difficult matter and should have been explained.—Editor.]

Measurement of Men

Display of assumed capabilities no guide to ascertaining the true worth of men—True merit in men needs no advertisement.

SOME recent occurrences have recalled to my mind a statement made by a former writer, in *Coal Age*, to the effect that a certain mine manager once expressed himself as preferring to choose the man who made a display of his capabilities, rather than one who made no such display but was willing to be judged by his work. It is hard for me to believe that many successful managers hire men on their display of supposed capabilities.

Now, it may be to an applicant's credit to be able to acceptably present his experience and refer to his record in previous undertakings, very much after the manner of those characteristics that make for good salesmanship. However, a good manager will look a little deeper; and, by questioning, ascertain for himself the probable fitness of the man for the position he has in view. There must be something more than the mere claim to capability if a wise choice of men is to be made.

Many Certified Men Have Failed

The fact that a man holds a certificate of competency does not always mean that he is capable of filling the position for which he applies. There are certified foremen, assistant foremen, firebosses and others, an investigation of whose record would show that they had practically failed; and yet each, in his own estimation, is capable of filling the position he desires. So confident is the applicant of his own ability that he is prone to make a display of what he can do, instead of modestly pointing to what he has done.

In the selection of men for responsible official positions in mines, I would be more favorably inclined toward the man whose record shows that he has had a practical experience and who has every appearance of being cool headed and observant of things about him, than toward the man who flaunts his certificate and boasts of what he can do in various situations. I would not expect a man's ideas always to conform to my own; but when overruled he should show a disposition to work with the same zeal as when following his own plan.

Ability to Promote Harmony a Chief Factor

The real merit of a man needs no verbal exploitation. One of the chief elements of a successful foreman is his ability to promote harmony among the men in his charge. The practical man knows that harmony and goodwill win the day where nothing else can avail. I have observed many mine superintendents and foremen who were worth all the company paid them, solely by reason of their ability to maintain harmony in the camp.

It used to be said that, "men do not always get what they deserve." But, that day is now past and the saying is suggestive of "passing the buck." As a matter of fact, we get nothing that is not coming to us. On the other hand, we always get what comes to us as the result of our own acts and thoughts. A man

is taught many a lesson by his own failures, though he may not see it that way at the time.

Speaking of meriting promotion, the first lesson a man has to learn is to measure himself correctly, and be able to shoulder the blame for his doing, instead of trying to pass it on to the other fellow. A grumbler is never in line for promotion, as he will spend too much time criticising the man above him to really do any constructive thinking himself.

Many years ago I was in a crowd of men who were discussing the promotion of a mutual friend, when a newspaper man made a remark that I have never forgotten. He said, "You seldom see a man hold a position long that he is not capable of filling."

Speaking for myself, I am not satisfied with my own progress. However, I am learning things, each day, that have been handicaps to a more rapid progress in my past. Candidly, I realize that I am where my own actions have brought me. That to which I have attained is the result of my thinking. I like to regard our thoughts as being fully recorded in our minds, making each one the product of his majority thoughts.

Neither money nor position is the full measure of a man's success in life. True success is attained by doing each day's recurring tasks better and more thoughtfully than before. Then, promotion will come when we are prepared for its greater responsibilities. ELKO.

Seattle, Wash.

Examination Questions Answered

Miscellaneous Questions

(Answered By Request)

QUESTION—*The length of a main-and-tail-rope haulage is 7,000 ft. (no grade); the weight of the main rope is 0.8 lb. per ft., and the weight of the tail rope 0.6 lb. per foot.; the full cars weighed 6,000 lb. and the empty cars 1,800 lb., each; the train consists of 15 cars. What are the tensions on the main and tail ropes? If the average speed is 10 miles per hour, what is the horsepower due to the maximum tension of the rope?*

ANSWER—In the general arrangement of a main-and-tail-rope haulage, the main rope hauls the loaded trip from the inby parting to the shaft or slope bottom, or the tipple, as the case may be, at the same time dragging the tail rope which is attached to the rear end of the trip. The weight of this loaded trip is 15(6,000 ÷ 2,000) = 45 tons; and that of the empty trip 15(1,800 ÷ 2,000) = 13.5 tons. The average weight of the two ropes being 7 lb. per ft., the entire weight of rope, extending in and out of the mine (14,000 ft.), is 7(14,000 ÷ 2,000) = 49 tons. Then, when hauling the loaded trip out of the mine, the entire moving load is 45 + 49 = 94 tons. Assuming an average track resistance of, say, 20 lb. per ton, the average tension on the main rope is 20 × 94 = 1,880 lb.

On the other hand, when hauling the empty trip into the mine, the average weight of the entire moving load is 13.5 + 49 = 62.5 tons and, for the same track resistance, the average tension on the tail rope is 20 × 62.5 = 1,250 lb.

At a speed of 10 miles per hour (5,280 × 10 ÷ 60 = 880 ft. per min.), the horsepower due to the maximum tension on the rope is (1,880 × 880) ÷ 33,000 = say 50 hp., which is the power due to the maximum tension on the rope and takes no account of the efficiency of the engine.

QUESTION—*In a single haulage plane where 17 loaded cars weigh 4,200 lb. each and the hauling rope is 4,500 ft. long and weighs 0.9 lb. per ft., what is the tension at the moment of moving the full load, the grade being 3.2 per cent? If the train is hauled at a velocity of 10 miles per hr., what is the required horsepower of the engine?*

ANSWER—In this case the weight of the loaded trip is (17 × 4,200) ÷ 2,000 = 35.7 tons. The weight of the rope lying on the incline is (0.9 × 4,500) ÷ 2000 = 2.025 tons. This makes the weight of the entire moving load, at the moment of starting the trip from the bottom, 37.725 tons. Then, assuming a track resistance of, say, 15 lb. per ton, for both cars and rope, and adding a grade resistance of 20 lb. per ton, for each per cent of grade, or 20 × 3.2 = 64 lb. per ton, the sum of the track and grade resistances is 15 + 64 = 79 lb. per ton of moving load. This makes the tension on the rope, at the head of the plane, when starting the trip from the bottom, 37.725 × 79 = 2,980.275, or say 3,000 lb.

A speed of 10 mi. per hr. is (5,280 × 10) ÷ 60 = 880 ft. per min. Finally, assuming an efficiency of 80 per cent in the haulage engine, the horsepower of the engine required to haul this load at this given speed is

$$H = \frac{3{,}000 \times 880}{0.80 \times 33{,}000} = 100 \ hp.$$

QUESTION—(*a*) *How is the horsepower of an engine determined?* (*b*) *The area of the piston of an engine is 500 sq.in., the mean effective pressure 30 lb. per sq.in. and the length of stroke 8 ft. If the engine is making 20 strokes per minute, what is the horsepower developed?*

ANSWER—(*a*) The mean effective pressure in the cylinder must be first ascertained from the engine card. Multiplying this mean effective pressure by the sectional area of the cylinder gives the total pressure on the piston. Finally, multiplying this total pressure by the piston speed in feet per minute and dividing that product by 33,000 gives the indicated horsepower of the engine.

(*b*) In this case, the total pressure on the piston is 30 × 500 = 15,000 lb. For an 8-ft. stroke and a speed of 20 strokes per minute, the piston speed is 8 × 20 = 160 ft. per min. Finally, the indicated horsepower of the engine is (15,000 × 160) ÷ 33,000 = 72.72 hp.

QUESTION—*The horsepower of an engine is 175; how many gallons of water per hour will be consumed?*

ANSWER—The water consumption of an engine, as in boiler practice, depends on a number of items not stated in the question. These items are: the mean effective pressure in the cylinder, the dimensions of the cylinder and percentage of clearance. However, with an ordinary slide-valve engine such as is in common use at many coal mines, a consumption of 5 gal., per horsepower per hour, would be a fair estimate. On this basis, a 175 hp. engine of the type mentioned would require 5 × 175 = 875 gal. of water per hour.

QUESTION—*A motor is taking 45 amp. of current at a pressure of 500 volts; what is the horsepower?*

ANSWER—The output of this motor is (45 × 500) ÷ 746 =, say 30 hp.

General Adoption of Automatic Substations at the Mines

Application of Automatic Features to Mine Substations—Economic Advantages — Saving in Power, Attendance and Maintenance — Description of Automatic Operation

BY J. E. BORLAND
General Engineer, Westinghouse Electric & Manufacturing Co.

FOR several years before the application of the automatic substation to mining service its position in the electric railway field had been firmly established by the success shown in reducing operating charges and improving service. Conditions in the railway industry had been such that an improvement leading to these results was of vital importance. While the mining industry was not confronted with this necessity to the same degree, the success of the automatic railway substation was logically followed by application of the same principle of operation to mining, as like results were to be expected because of a similarity in power requirements and distribution.

Both industries require the transmission of direct-current power over a considerable extent of territory, which often necessitates a large investment in feeder copper and distributed substations to maintain satisfactory trolley voltage. Although the haulage distance of the average mine is in general much less than that of an electric railway, the lower trolley voltage used in most mines because of safety considerations makes the two fields comparable in many respects. In both cases the load varies over a wide range, and the service is subject to more or less frequent interruption caused by excessive overloads or short-circuits, this being particularly true in mining service. That the advantages of automatic substation equipment under such conditions are being generally recognized is demonstrated by the rapid expansion in its use in mining substations within the last two years.

The first substation equipped with automatic control to be installed in an American mine was put into service in January, 1921, by the Lincoln Coal Co., at Nanty-Glo, Pa. The mine using this equipment is a drift opening having a main-haulage distance of more than two miles with grades against the loading trips throughout the entire length. The substation consists of a 200-kw. 250-volt synchronous motor generator set installed in a concreted room along the main haulageway about two miles from the drift mouth. Power is supplied through a three-conductor 2,200-volt cable entering the mine through a borehole.

The Lincoln Coal Co. substation is normally started and stopped by means of a small control switch operated by the first man entering the mine in the morning and by the last man out at night. By throwing a small double-throw knife switch on the switchboard, operation of the equipment is made entirely automatic, the substation starting when the trolley voltage is reduced below a predetermined value for more than 5 seconds, and shutting down when the load is reduced for a certain time interval. This installation followed very closely the practice of automatic control and protection for railway substations, including protection from hot bearings, overspeed, overheating, reverse current, reverse phase, low a.c. voltage and excessive overloads by the use of current-limiting resistors. The substation has given entirely satisfactory operation since it was first installed, and through the improved voltage conditions obtained the haulage time has been considerably reduced and the mine capacity correspondingly increased.

Without doubt the principal stimulus to the use of automatic substations has been the direct reduction of operating expenses obtained by automatic operation. In general this saving is made up of several items which vary to some extent with local conditions, such as the size of the mine, cost of attendance, characteristics of power demand and equipment in operation.

The elimination of a regular attendant, of course, is the principal factor in the economy of the automatic substation. Where the substation location is such that a manually controlled equipment would require the presence of an operator at all times, automatic equipment will release him for other work, and the automatic operation and protection of the substation will be much more efficient than is possible with manual control. As the automatic equipment requires only short inspections at weekly intervals, the direct saving resulting from elimination of the operator amounts to almost the entire amount of his wages. In comparing the two types of substations the entire cost of periodical inspection cannot be charged properly against the automatic equipment, as a similar item is necessary with manual equipments for frequent inspections and attention by the maintenance crew. This reduction of labor charges will often show a saving sufficient to entirely wipe out the original cost of the automatic equipment in two or three years.

At many mines the substation is located so that it can be started and given intermittent attention throughout the day by a man employed regularly on other work,

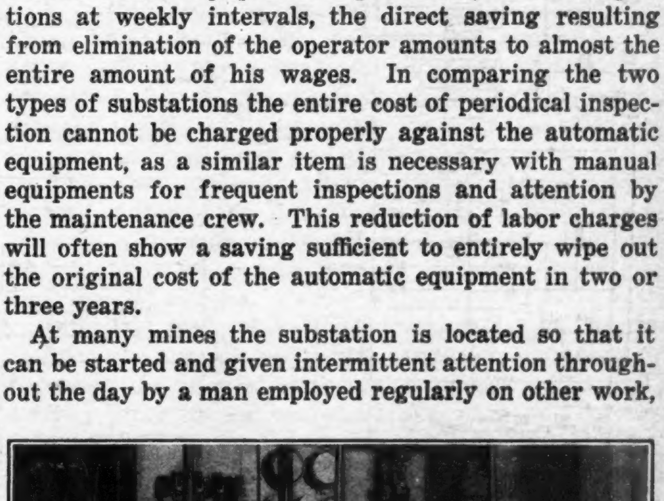
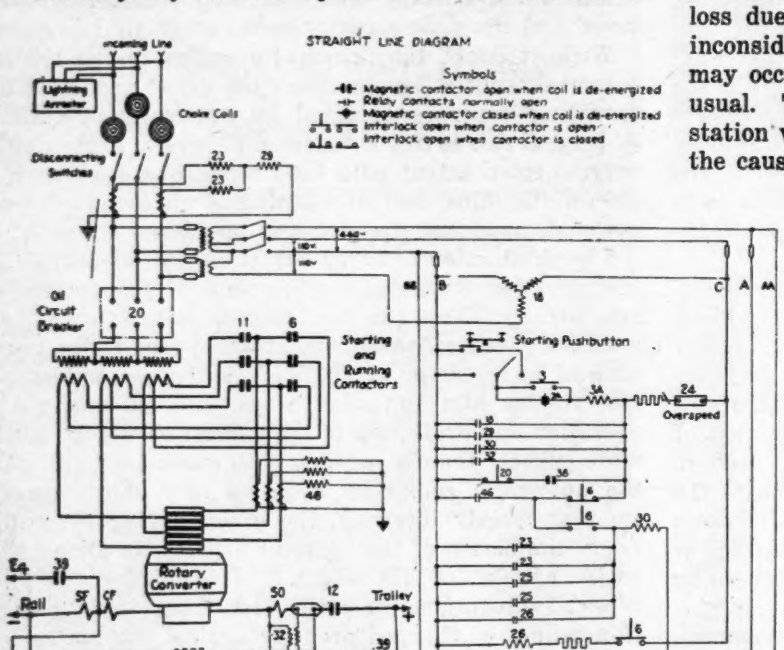


FIG. 1—LAYOUT OF UNDERGROUND AUTOMATIC SUBSTATION

This station is equipped with a synchronous converter, behind which is shown the complete switchboard for automatic control and protection.

such as a mine clerk or a hoist operator. This usually requires that the substation be placed farther from the load than would be necessary otherwise, with the result that the cost of installation is increased somewhat by the added length of positive and return feeders, and the trolley voltage and efficiency is reduced by the drop in the added feeders. Fairly satisfactory operation can be obtained with such attendance, in case the man whose duty it is to look after the substation is available at any time throughout the day. It often happens that his regular work requires him to leave the vicinity of the substation at various times, or conditions may be such that interruptions of service are not immediately observed.

The majority of interrruptions of service from a mining substation are caused by heavy overloads from locomotives or by short-circuits on the trolley system, which opens the d.c. circuit breaker. If the attendant loses no time in getting to the substation, service is restored with small delay by reclosing the circuit breaker, provided the trouble is cleared. The usual result of depending upon an irregular operator, however, is a considerable amount of time lost every day through delays in restoring power after interruptions. The losses chargeable to this source are in the form of reduced tonnage and consequent increased capital charges, idleness of motormen, trip riders and other day men, and the general dissatisfaction and confusion which follows an interruption in service for any length of time. While it is a difficult matter to estimate the loss due to such causes it is obvious that this is not inconsiderable when delays of ten minutes or more may occur several times daily, which is not at all unusual. This is entirely avoided by the automatic substation which restores service almost immediately after the cause of interruption is removed. In addition, the



LIST OF APPARATUS

3 - Master Control Relay - S.P.
3A - Auxiliary Master Control Relay - S.P.
4 - Starting Control Relay - 2P.
5 - Running Control Relay - 2P.
6 - A.C. Starting Contactor - 3P.
7 - D.C. Polarized Motor Relay
9 - Field Reversal Control Relay - 2P.
10 - Field Reversing Contactor - 4P.
11 - A.C. Running Contactor - 3P.
12 - D.C. Line Contactor - S.P.
17 - Knife Switch - S.P. D.T.
18 - Phase Failure and Low Voltage Relay - S.P.
19 - Starting Transfer Relay - 2P.
20 - High Tension Oil Circuit Breaker Closing Coil
20A - High Tension Oil Circuit Breaker Latch Coil
22 - High Tension Oil Circuit Breaker Control Relay - S.P.
23 - A.C. Overload Relays - S.P.
24 - Overspeed Device
25 - Bearing Thermostats - S.P.
26 - Starting Time Limit Relay - S.P.
29 - A.C. Thermal Overload Relay - S.P.
30 - Lockout Relay - S.P.
32 - D.C. Reverse Current Relay - S.P.
38 - Field Current Relay - 2P.
39 - Equalizer Contactor - S.P.
46 - Phase Balance Current Relay - S.P.
50 - D.C. Series Overload Relay - S.P.
50T - D.C. Series Overload Relay Trip Coil
50R - Latch Release on Overload Relay
51 - D.C. Line Contactor Reset Relay
52 - Reset Delay Relay S.P.

SEQUENCE TABLE

Operation Number	3A	3	4	6	22	20	20A	26	7M	7C	7D	9	10	7B	19	5	11	38	39	12	Remarks
1	●																				3A closed by remote control pushbutton or by knife switch on switchboard
2	●	●																			Master control relay 3 closed, energizing control bus A'.
3	●	●	●																		Starting control relay 4 closed by energizing of bus A'.
4	●	●	●	●	●																Starting contactor 6 and oil circuit breaker control relay 22 closed
5	●	●	●	●	●	●		●													Oil circuit breaker 20 closed, starting converter, and delay relay 26 energized
6	●	●	●	●	●	●	●	●	●	●											Oil circuit breaker latch 20A closed, and polarized motor relay 7 energized
7	●	●	●	●		●	●	●	●	●											Oil circuit breaker control relay 22 de-energized
8	●	●	●	●			●	●	●	●											Oil circuit breaker closing coil 20 de-energized
* 9	●	●	●	●			●	●	●	●	●										Polarized motor relay contact 7D closed if converter polarity is reversed
* 10	●	●	●	●			●	●	●	●	●	●									Field reversal control relay 9 closed
* 11	●	●	●	●			●	●	●	●	●	●	●								Field reversing contactor 10 energized
* 12	●	●	●	●			●	●													Contactors 7, 9 and 10 de-energized as D.C. voltage drops to zero.
13	●	●	●	●			●	●	●	●											Polarized motor relay energized by corrected D.C. voltage.
14	●	●	●	●			●	●	●	●				●							D.C. polarity correct, polarized motor relay contact 7B closed.
15	●	●	●	●			●	●	●	●				●	●						Starting transfer relay 19 closed
16	●	●		●			●	●	●	●				●	●						Starting control relay 4 de-energized
17	●	●					●	●	●	●				●	●						Starting contactor 6 de-energized
18	●	●					●							●	●	●					Running control relay 5 closed, relays 7 and 26 de-energized
19	●	●					●								●	●	●				Running contactor 11 closed
20	●	●					●								●	●	●	●			Field current relay 38 closed
21	●	●					●								●	●	●	●	●		Equalizer contactor 39 closed
22	●	●					●								●	●	●	●	●	●	Line-contactor 12 closed

* These operations are omitted if converter starts with correct polarity.

FIG. 2

Wiring Diagram Showing Control and Protective Equipment

Automatic equipment used with mine converting machines makes possible the location of the substation at the most economical point for distribution regardless of the accessibility from the standpoint of attendance.

automatic equipment provides protection which is left to the observation of an operator in a manual station, so that a manually operated station without constant attendance is only partly protected.

Another pronounced advantage of the substitution of automatic control and protection for manual operation is that the substation is better adapted to be located at the most efficient point with respect to the load. This is of particular importance in the case of mines developed to a considerable distance from the opening.

In starting the development of a mine it is the usual practice to install near the mine opening a substation of sufficient capacity to meet the initial requirements. As the development progresses and tonnage is increased, the addition of locomotives, mining machines and pump motors frequently requires an increase to be made in the substation capacity. Furthermore, with increased distance of transmission, the voltage drop in the trolley circuit may be so large at times that it will become necessary to install heavy feeders to maintain satisfactory voltage to gathering locomotives and mining machines at the working face. Under conditions similar to these the addition of feeders can be obviated, and high voltage maintained at all motors by installing a substation as near as possible to the load center. This may be done by locating the equipment in an underground room and running to it a three-conductor alternating-current cable through a borehole, or the substation may be located on the surface, and the direct-current feeders lowered in the borehole. Fig. 1 shows a substation installed in an underground room. When the location is convenient to an alternating-current line, the cost of such an automatic substation will often be less than that of a similar increase of the existing substation and feeder capacity. In addition voltage conditions will be improved to a greater extent than would be practicable by adding to the outside substation.

Various Ways of Starting and Stopping

Numerous automatic mining substations have been applied in this manner. These equipments are started and stopped in a variety of ways: by remote control from a circuit breaker in the alternating current feeder, by pushbuttons and a pilot circuit energizing a master relay at the substation, by a time switch adjustment to start and stop the station at desired times, and by combinations of these forms of control. In mining substations it is not considered desirable to follow the railway practice of starting automatically upon reduction of trolley voltage to a predetermined value and shutting down when the load has reduced, as there is no appreciable advantage in this refinement in mining work, and the equipment is simplified somewhat by its elimination.

In general a considerable demand for power is being made constantly by gathering locomotives, mining machines and pumps, to which is added the requirements of the main haulage locomotives so that it is generally desirable to have the substation running continuously to maintain high voltage at these various motors, in addition to being able to supply without delay any sudden overloads. In substations consisting of two units it is the usual practice to provide for automatic starting of the second machine by a thermal relay in case the load is such that overheating of the first machine would result unless it were relieved. When the load is decreased for a predetermined time the second machine is automaticaly disconnected and stopped. By this means the light load losses of the second machine are eliminated at times when the demand can be satisfactorily met by the first unit alone.

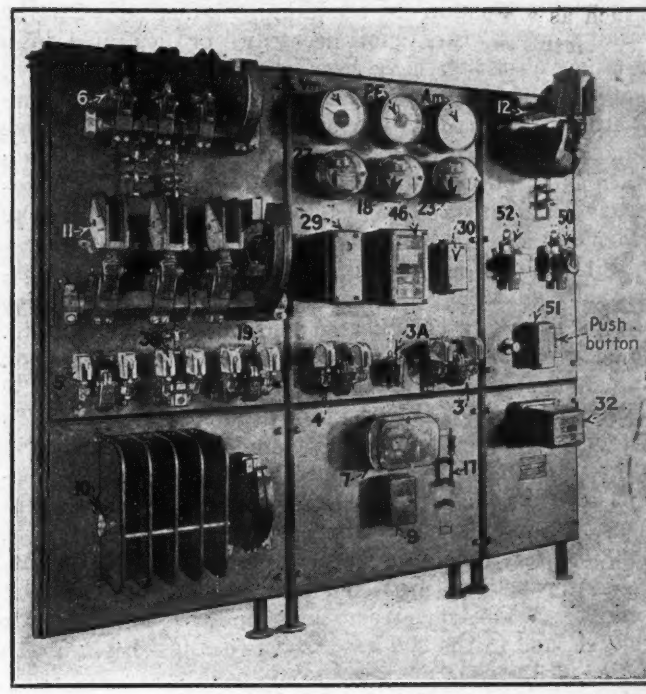


FIG. 3—COMPLETE SWITCHBOARD FOR AUTOMATIC SUBSTATION

The equipment for automatic operation rarely occupies much more space than the manually operated equipment. The proper functioning of the station depends on a certain sequence of relay operations.

A further economy resulting from the substitution of automatic for manual operation is a reduced maintenance charge due to better handling and protection of the equipment. With automatic control each switching operation is a direct function of the electrical condition existing at that particular moment, and as each succeeding operation is dependent upon the proper functioning of those preceding, the equipment is started and put into service in the smoothest possible manner, and all possibility of damage through incorrect or careless switching is avoided.

Automatic protective devices prevent damage to the equipment from any abnormal condition or source of trouble with the least interruption to service, the substation being locked out of service only in case the presence of an inspector is required. As these devices perform immediately the functions ordinarily left to the observation and judgment of an operator, serious damage often is averted which might otherwise result from failure to act promptly. In addition to reduced maintenance and added life of the equipment, extended periods of time lost in repairing damaged equipment are avoided.

As these advantages of automatic operation became generally recognized the demand in the mining industry soon increased to such an extent as to warrant the standardization of automatic control equipment for motor generator sets and rotary converters of the capacities generally used in mining service. These include machines up to 300 kw., 25 or 60 cycles, 2,300 volts d.c., 275 or 600 volts d.c., this being the largest rating usually desired in a single unit. The design of these standard equipments is based on the extensive experience obtained in the railway field and in the early mining installations.

Thorough consideration has been given to the re-

quirements peculiar to the mining industry, with the result that features not necessary or desirable in a mining substation have been eliminated, and the cost and complication considerably reduced thereby. Simplicity and reliability have been considered of prime importance. The control and protection of these substations is obtained largely through the use of magnetic contactors and relays that have been proved by years of service in industrial and power-control work.

With those who are unfamiliar with automatic substation equipment there is apt to be a feeling that the control is highly complicated and difficult to maintain. This is not the case, however, as the entire operation and the functions of the various devices can be readily understood after a little study and experience. To demonstrate this it is thought advisable to describe in some detail the performance of an automatic synchronous converter substation which was recently put into operation in a Western coal mine. This type of equipment is not quite so simple as that for a motor-generator set, as provision must be made to correct polarity if the converter starts up with reversed d.c. voltage, and in the 300-kw. size the d.c. brushes must be raised at starting.

The complete wiring diagram of this substation is given in Fig. 2, showing all power and control circuits, omitting only the meters, which have no part in the automatic operation. The diagram is arranged to show the various circuits as short and direct as possible, to facilitate tracing out. Operation of the equipment in starting up is outlined by the sequence table. A detailed description of a mine installation is given below.

The automatic switchboard is shown in Fig. 3, the principal control and protective devices being mounted on slate bases assembled on pipe framework. The various devices are numbered to correspond to the diagram and list of apparatus. The high-tension oil circuit breaker with its operating mechanism is mounted on a separate panel—Fig. 4—so that it may be set up in the most convenient location. This equipment controls a 150-kw. 275-volt d.c. synchronous converter supplied from a 2,200-volt 3-phase 60-cycle line, representing practically the latest practice in the automatic operation of a mining substation of this type and rating.

Details of Automatic Operation

In normal operation of the substation the disconnecting switches and control knife switch shown in the diagram are closed at all times, and the S. P. D. T. knife (17) switch shown at the bottom of the switchboard is closed on the bottom contact corresponding to the right-hand contact in the diagram, which provides for starting and stopping from a remote pushbutton. The station also can be started and stopped independently of the remote pushbutton by the use of the top contact of the S. P. D. T. knife switch (17), when the substation is being inspected. The converter then starts automatically with the proper sequence of operations, according to the following explanation, which can be more readily understood by referring to the diagram:

Operation 1—The coil of the auxiliary master relay (3*A*) is energized by the starting device, being connected across the 110-volt bus *B-C* through the overspeed device (24) and the contact 7*A* of the polarized motor relay (7). Contact 7*A* is closed only in the neutral or de-energized position of relay (7) so that the relay must be in this position before starting up.

Operation 2—The master control relay (3) is energized through the contacts of relay (3*A*). Closing of relay (3) energizes the 440-volt control bus *A*.

Operation 3—When bus *A* is energized, the coil of the starting control relay (4) is energized through interlocks on relay (19) and running contactor (11). This prevents closing of the starting control relay (4) unless the running contactor (11) is open.

Operation 4—Through one contact of relay (4) the coil of the starting contactor (6) is energized. The other contact of relay (4) energizes the high-tension oil circuit breaker control relay (22).

Operation 5—Closing of the starting contactor (6) connects the collector rings of the converter to low-voltage starting taps of the power transformers. Closing of relay (22) energizes the closing coil of the high-tension oil circuit breaker (20) across the 440-volt control bus *AA-BB*. Closing of the oil circuit breaker (20) connects the high-tension side of the transformers to the line, and starts the converter on reduced voltage through starting contactor (6). The starting time-delay relay (26) is energized by an interlock closing with contactor (6). The contacts of relay (26) close after a definite time delay, provided the starting sequence is not completed.

Operation 6—The oil circuit breaker latch (20*A*) is energized by an interlock which closes with the oil circuit breaker (20). The polarized motor relay armature and clutch (7*M* and 7*C*) are energized from the direct-current side of the converter through an interlock on starting contactor (6).

Operation 7—The oil circuit breaker control relay (22) is de-energized by an interlock which opens when the oil circuit breaker latch (20*A*) closes.

Operation 8—The oil circuit breaker closing coil (20) is de-energized by opening of the control relay (22). The oil circuit breaker is now held closed by latch (20*A*), which requires only a small amount of power.

Operation 9—With a rotary converter starting in this manner provision must be made to reverse the direction of field excitation momentarily to correct the d.c. polarity if the machine starts up reversed. This is the function of the polarized motor relay (7). The relay consists of a small direct-current armature (7*M*) placed in the field between poles of a permanent magnet. When the armature (7*M*) is energized it drives through a gear train and a magnetic clutch (7*C*) a small drum carrying the moving parts of two sets of control contacts (7*B* and 7*D*). The direction of rotation of the relay determines which of these two sets of contacts will close.

Under operation 6 it is noted that the polarized motor relay, armature (7*M*) and clutch (7*C*) are energized from the d.c. brushes of the rotary converter. As the machine comes up to synchronous speed the relay armature receives direct current and begins rotating in a definite direction which is dependent on the direction of current flow and accordingly on the polarity of the converter. If the polarity is incorrect when the machine reaches synchronous speed, the direction of rotation of the relay will be such that contacts (7*D*) are closed.

Operation 10—Closing of polarized motor relay contact (7*D*) energizes the field reversal control relay (9), which is excited from the direct-current side of the rotary converter.

Operation 11—Closing of relay (9) energizes the coil of the 4-pole double-throw field-reversing contactor (10) through the starting control relay (4). This closes the upper row of contacts, which are normally open, and

reverses the excitation of the converter. With the excitation reversed the rotary converter "slips a pole," and the voltage drops to zero, the shunt field being split in two and the two halves connected in parallel to insure rapid operation on reversing.

Operation 12—When the converter voltage drops to zero the polarized motor relay (*7M* and *7C*) and relay (9), which are excited from the d.c. side, are de-energized and the rotating drum of the polarized motor relay is returned to the neutral position by a spring. Opening of relay (9) de-energizes the field-reversing contactor (10), which is closed and held in its normal position by gravity. The rotary converter having dropped back a pole, its polarity is now correct with normal excitation.

Operation 13—As the d.c. voltage builds up with correct polarity, the polarized motor relay (*7M* and *7C*) is energized in the opposite direction.

Operation 14—Rotation of the polarized motor relay in the opposite direction closes contact *7B* after an inherent time interval.

Operation 15—Closing of contact *7B* energizes the starting transfer relay (19) from the 440-volt control buses *B-A'*.

Operation 16—The starting control relay (4) is de-energized by an interlock which opens when starting transfer relay (19) closes.

Operation 17—Opening of the starting control relay (4) de-energizes starting contactor (6).

Operation 18—Polarizing motor relay (*7M* and *7C*) and starting time delay relay (26) are de-energized by interlocks which open with starting contactor (6).

The running control relay (5) is energized through relay (19) and an interlock which closes when starting contactor (6) opens. This prevents closing of the running contactor until the starting contactor has opened.

Operation 19—Closing of running control relay (5) short-circuits a series resistor in the converter field circuit, and also energizes the running contactor (11). This connects the rotary converter collector rings to the full voltage taps of the power transformers. The converter is now running light with full voltage.

Operation 20—Increasing of the converter field excitation to normal value by closing of relay (5) closes the field current relay (38). This relay prevents loading of the rotary converter until its field is excited.

Operation 21—Closing of the field current relay (38) energizes the equalizer contactor (39) through master relay (3), and an interlock closing with running contactor (11). This equalizer contactor is mounted separately and is required only in case the converter is to operate in parallel with another machine.

Putting Converter on the D. C. Line

Operation 22—The d.c. line contactor (12) is energized through a normally closed pushbutton, the overload relay contacts (50) and an interlock closing with the equalizer contactor (39). This requires the equalizer contactor (39) to be closed before the d.c. line contactor (12).

An interlock closing with the d.c. line contactor (12) shunts the contact on master control relay (3) which connects buses *A* and *A'*. This prevents disconnecting the converter from the a.c. line until the d.c. side is opened.

It will be seen by the preceding explanation that the entire operation of starting is carried through in the correct sequence, and with no more than the proper amount of delay to allow the machine to come up to speed. All danger of damage to the equipment from faulty or careless switching is removed. The equipment is started and in operation in 10 to 20 seconds after closing of the starting contact, depending on the setting of delay relay (52).

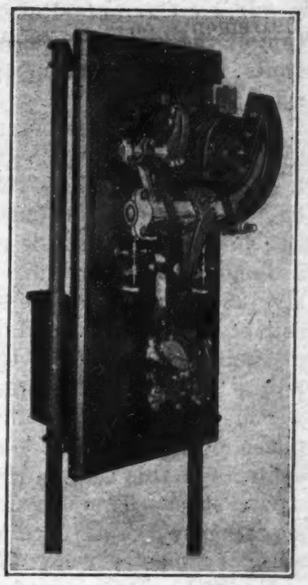


FIG. 4—MAIN LINE OIL SWITCH ON ALTERNATING-CURRENT SUPPLY

At one time the human element seemed necessary and highly desirable for the proper care and operation of converting equipment. Today automatic equipment gives far better results than manually operated equipment. The switch in the photograph functions more positively than any manually operated switch, in that the contacts are completely and positively made whenever the switch is closed.

The protective equipment is designed to provide adequate protection from damage by any abnormal operating condition, and at the same time to assure the least possible interruption of service. Reference to the diagram will show the relation of the protective devices to the rest of the apparatus.

In case of trouble which will not be cleared automatically it is necessary to lock the station out of service. For this purpose lockout relay (30) is used. When the lockout relay is energized its contacts short-circuit the coil of the auxiliary master relay (*3A*), and the station is shut down by the opening of relay (*3A*). The contacts of the lockout relay (30) on closing are held in this position by a latch, so that the station is prevented from restarting until the latch is reset manually by a maintenance man. The coil of lockout relay (30) is energized by protective devices which operate in case of trouble requiring an inspector's attention.

Alternating-Current Overload—Two induction type overload relays (23) energize from current transformers provide protection from excessive alternating-current overloads. These relays are set to operate only on very abnormal overloads such as would be caused by a short-circuit on the alternating-current side, the d.c. relays protecting against ordinary overloads. Operation of the a.c. overload relays locks out the station by closing relay (30), which opens master control relays (*3A*) and (3).

Bearing Protection—The rotary converter is equipped with two bearing thermostats (25) which operate relay (30) and lock out the station if the bearing temperature rises to a dangerous point.

Starting Protetcion—If the starting operation is interrupted and the converter remains connected to the starting taps for a longer period than necessary the station is locked out by the starting time delay relay (26).

Unbalanced Phases—If for any reason the phase currents to the converter become unbalanced the station will be shut down by the phase balance current relay (46), the contact of which short-circuits the coil of the auxiliary master relay (*3A*). If the condition still exists when an attempt is made to restart, operation of relay (46) will close relay (30), and lock the station out of service until the trouble is located and cleared.

Reverse Current—Reverse current or inverted operation of the converter is prevented by relay (32), which shuts down the station by short-circuiting the coil of relay (3*A*).

Overheating—Overheating of the converter from sustained overloads is prevented by the a.c. thermal overload relays (29). This relay is essentially a thermostat having a temperature characteristic similar to that of the converter so that the relay contact closes just before a dangerous temperature is reached. Operation of relay (29) shuts down the station by short-circuiting the coil of relay (3*A*), and the contact of relay (29) is maintained for a time to allow the converter to cool before starting up again.

Phase Failure—Starting of the station under single phase or reverse phase is prevented by relay (18). The contacts of this relay are closed also by low a.c. voltage.

Overspeed—The converter is prevented from overspeeding by a centrifugal device (24) which disconnects auxiliary master relay (3*A*).

No Field—Opening of the converter shunt field circuit de-energizes relay (38) and prevents closing of the d.c. line contactor (12).

D.C. AUTOMATIC CIRCUIT BREAKER PROTECTION

Direct-Current Overload—The converter is protected from excessive overloads and short-circuits on the d.c. side by overload relay (50), which causes the line contactor (12) to open. The overload relay is provided with a dash pot so that service is not interrupted by momentary overloads within the capacity of the converter, while rapid operation is obtained on short-circuits. When opened, the contacts of relay (50) are held in that position by a latch.

When the d.c. line contactor (12) opens, the coil of the reset delay relay (52) is energized through an interlock. Closing of the reset delay relay is retarded by an oil dash pot which may be adjusted to the desired value. When relay (52) closes, the resistance of the load between trolley and rail, in series with resistor *RY*, forms one leg of a Wheatstone bridge arrangement, the remainder of which is composed of *RW*, *RX* and *RZ*. The coil of the d.c. line contactor reset relay (51) is used with this grouping in such a manner that its contacts are closed when the resistance between trolley and rail has increased to such a value that the converter will not be overloaded upon closing of the line contactor. Operation of relay (51) energizes the latch release coil (50*R*) which trips the latch holding open the contacts of overload relay (50). The d.c. line contactor (12) then recloses and the shunt reset relays are de-energized.

By this method the equipment is fully protected from excessive d.c. overloads, and the service is restored almost immediately after the cause of interruption is removed, except when intentionally delayed by relay (52).

The installation described provides all the operating and protective devices necessary for a station of medium size. The standard equipment is sufficiently flexible, however, to permit the addition of other features that may be desired.

As shown by this discussion, the operation and protection of the automatic equipment is much more reliable than that to be expected of manually controlled equipment. As a result of this and its economic advantages, the automatic substation is rapidly gaining favor in the mining industry, and warrants serious consideration for new installations. Existing manually controlled stations can be arranged to obtain the benefits of automatic operations with minor changes in the equipment.

Electrical Engineers in Annual Convention And Technical Sessions

THE American Institute of Electrical Engineers held its thirty-ninth annual convention at Swampscott, Mass., June 25 to 29. Headquarters were at the New Ocean House. Dr. A. E. Kennelly, chairman of the convention committee, made the welcome address on Monday. At the same meeting President Frank B. Jewett delivered an address on "The National Engineering Societies, Their Problems of the Past, Present and Future."

The first technical session was held on Tuesday morning, when papers were read by Messrs. Steinmetz, Hayden, Eddy and Simons, pertaining to cable charge, dielectric strength and capacities of conductors. In the evening demonstrations were given of a 30,000-watt incandescent lamp and of the public address system with telephone lines.

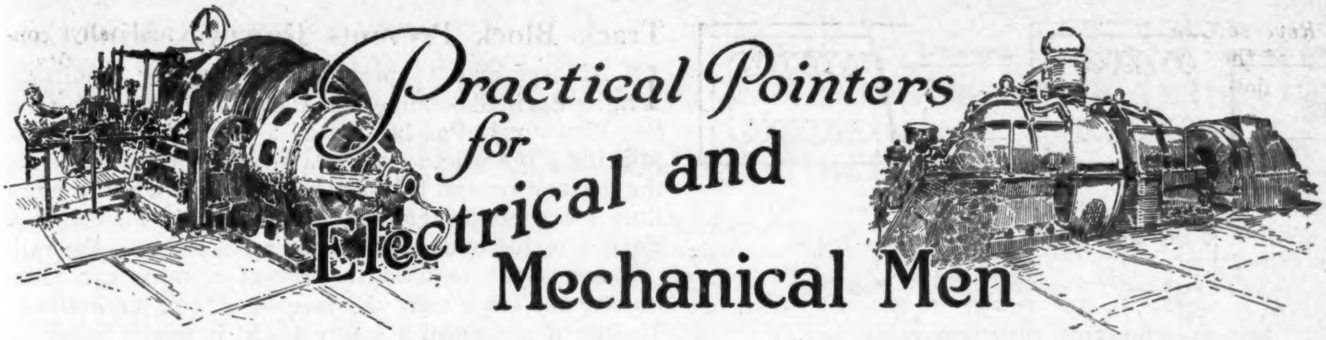
The technical sessions held on Wednesday were descriptive of the Weymouth Power Station, the ultimate capacity of which is to be approximately 300,000 kw. and where considerable research and experimental work is being done with a boiler and turbine designed for operation at a steam pressure of 1,200 lb.

An interesting paper on "Cooling of Electric Machines" also was read. This paper dealt with the ability of copper, iron and insulation to dissipate heat by conduction and showed the results of tests to determine the rate of heat dissipation by natural ventilation, radiation and convection currents. Several interesting papers also were read on plants and equipment used in transoceanic telephony and national broadcasting and receiving. Other papers covered a large variety of subjects relating to transmission of electricity, protection and utilization problems and developments.

Inspection trips to many points of technical and historical interest were arranged. The General Electric Co.'s Lynn works, Simplex Wire & Cable Co. plant, New England Telephone & Telegraph Co. exchange and Watertown Arsenal were most popular.

About 1,200 members and guests were presented, which shows the growing appreciation of the importance of the work of the society in promoting electrical science and its pioneering in electrical application.

SALES OF EXPLOSIVES in the United States in April, 1923, according to the U. S. Bureau of Mines, amounted to 598,622 kegs of black blasting powder, 5,443,735 lb. of permissible explosives, and 23,466,571 lb. of high explosives other than permissible. Each of these figures represents a large increase over April sales during the past four years with the single exception of black powder sales for April, 1920, which amounted to 611,979 kegs. The figures presented are based upon reports from manufacturers whose sales amount to about 90 per cent of the total sales of explosives in the United States. The quantity of black powder sold in April was 1.3 per cent less than the amount sold in March, 1923, but it exceeded by 222 per cent the sales for April, 1922, when coal mining, the principal consuming industry for black powder, was so greatly affected by the miners' suspension of work. April sales of permissibles were 20 per cent more than in March, 1923; 228 per cent more than in April last year, 125 per cent more than in April two years ago, and 48 per cent more than in April 1920.



Electrolysis from Current Leaks

WE ARE experiencing considerable difficulty in one of our mines due to electrolytic action on some of our important cable systems and also on pipe systems. I would like to have some suggestions as to how some of this leakage may be eliminated and the damage resulting at present reduced. MINE ELECTRICIAN,
Pennsylvania.

The greatest cause of electrolysis in coal mines is insufficient bonding of track joints. Usually this would mean that a larger number of bonds is needed but it also means proper installation of bonds and the correct type of work.

Poorly bonded joints may cause the current to leave the track and flow toward the power house or substation through a gas or water pipe or the metal sheath of an electric cable. This leakage current may cause electrolysis at the joints of the pipe and in time destroy the joints.

Because of its location or surroundings this pipe or sheath may become electro-positive to some other pipe or the track, and in leaving the pipe or sheath the current sets up an electrolytic action which is destructive to the spot where it leaves. The result of electrolysis is readily recognized but it is difficult and sometimes impossible to locate it is its incipient stage.

Whenever a pipe or the ground in the vicinity of a negative return rail is electro-positive to that rail (measured with a low reading voltmeter) it is fair to assume that all the current is not returning on the rail and that an electrolytic action is in progress. The destructive action is a direct function of time but is not always proportional to the magnitude of the leakage current and a small current density may cause very serious corrosion.

There are three remedies for electrolysis. First, by permitting the leakage to continue but by bonding the pipe joints and connecting the pipe electrically to the return lead of the generator, the current remains on the pipe and cannot start destructive electrolytic action. Second, by installing insulated joints in the pipe the current can not flow over it but must flow through the ground. Third, by electrically bonding the pipe joints in certain zones and then bleeding the current from the pipe by return cables the current is returned without destructive action. This is called a mitigating system.

The three schemes are difficult to carry out successfully and being corrective in principle rather than preventive, none of them protects the rail which may be eaten away at the base, due to the current leakage. The best scheme is to prevent current leakage by having efficient bonding and a return track circuit which is the path of least resistance to the generating station. To obtain this it may be necessary to supplement the rail return with negative cables or negative boosters, but in any case the current should be kept where it belongs.

Block Signal for Mine Track

WE HAVE been able to save considerable time and eliminate many wrecks by using a simple block signal in handling trips on partings. An arrangement such as shown in Fig. 1 was used. One wire was fastened to an insulated section of the parting track and the other fastened to the opposite rail. These wires were connected to the regular binding posts of a 20-volt a.c. bell, from which the gong was removed. A pair of wires from the regular 220-volt lighting circuit with a lamp in the circuit were connected by placing one wire on an insulated piece of iron where the clapper would rest with no current flowing through the electromagnets; the other wire was grounded to the bell frame.

When there are no cars on track *A*, shown in Fig. 1, the clapper of the bell is pulled away from the electromagnets by the clapper spring, which causes the clapper to come in contact with the insulated piece of iron. Completing the 220-volt circuit through the frame of the bell and causing the light to burn. When cars are on track *A* the 20-volt circuit is closed by the current passing through the wheels and axles of the cars, causing the electromagnet to become magnetized and thus pulling the clapper away from the piece of insulated iron, breaking the circuit and putting the lamp out. Thus, with the above-described connections the rope runner dropping empties into the parting can tell at a glance if the track is clear which is indicated by the lamp when lighted. If the light was out it would indicate that there were cars on the track and he would have to wait until the light came on.

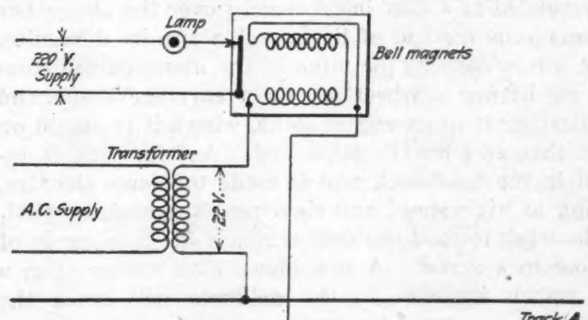


FIG. 1—BLOCK SIGNAL CIRCUIT

Cars standing on the section of track which is insulated completes the 22-volt circuit, which, operating through the bell magnets, opens the local 220-volt circuit, thus putting the lamp out. When there are no cars on the track the control circuit is not operative and consequently the spring on the clapper of the magnet frame closes the local circuit and keeps the lamp lighted.

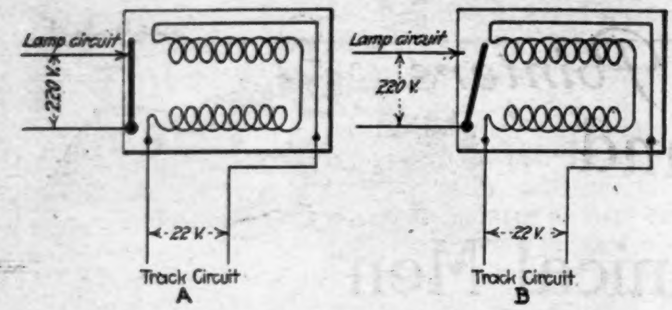


FIG. 2—OPERATION OF IMPROVISED RELAY
A shows the track circuit open and the signal circuit closed, thus lighting the lamp. B shows the track circuit closed and the signal circuit opened, the lamp being out.

A different arrangement can readily be made by changing the insulated piece of iron so that when the cars are on the track the clapper will come in contact with it. With this arrangement the light would burn with the cars on the track and would not burn when the track was empty. The first arrangement has been used because at many places there are times when the power goes off, so that with this arrangement no damage can be done because the absence of a burning light indicates that there are cars on the track. An enlarged sketch of the action of the bell under both conditions is shown in Fig. 2. These are self-explanatory.

In some places the block signal is placed on track *B*, indicating when the loaded cars are on the track and preventing dropping more cars into the parting until it is clear. There are several possible arrangements for this system which any electrician can readily make to accommodate local conditions. The cost of this installation is very low. The only materials needed are a 20-volt bell (without gong), a stepdown transformer, a lamp socket and lamp with sufficient wire to make connections. The insulated sections in the track are made of wood.

CECIL ROWE,
Mining Engineer.
Tokay, N. M.

Worn Locomotive Tires Removed Through Aid of Engine Lathe

REMOVAL of worn locomotive tires from the wheels by driving in a drift punch, thereby cracking the tire, as an alternative method to that of the acetylene flame is suggested by the New Field By-Product Coal Co., of North Bessemer, Pa. Either method can be recommended as a vast improvement over the altogether too dangerous method of lifting off a tire by dynamite.

The job is done at the mine of the above-named company by lifting a wheel set by a carriage crane and transporting it to an engine lathe, where it is placed on blocks that rest on the lathe bed. A ⅜-in. drill is inserted in the headstock and is made to pierce the tire, running at high speed and clearing the wheel, by feeding the work toward the drill through the turning in of the footstock screw. A few blows of a sledge upon a drift punch inserted in the drillhole will crack the tire.

Two men can remove four 18-in tires and shrink on new ones in two hours. While the worn tires are being removed the new ones are being heated so that no time is lost in making the change.

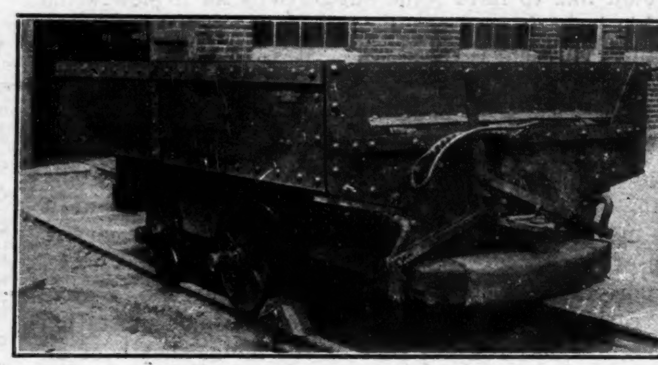
EUROPEAN NATIONS MAY BURY the hatchet, but they seem to retain plenty of axes to grind.—*Brooklyn Eagle.*

Track Block Prevents Runaway Mine Cars

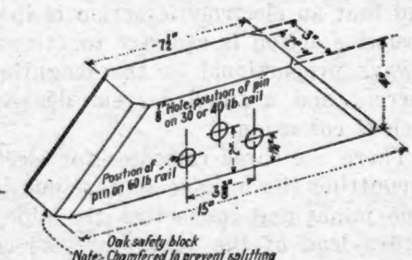
IN AN endeavor to provide safe working conditions in its Springdale mine the Allegheny-Pittsburgh Coal Co., Pittsburgh, Pa., has placed a safety block in every working place whether it be a room or a heading. As the illustration and the sketch show, it is nothing more than a trapezoidal block of oak which is pinned to a clevis inserted under the rail so as to embrace the rail.

Primarily it is used to prevent a mine car from leaving the track near the face of a room or heading. Though it is termed a safety block, it might better be called a track block in that its sole function is to block the track. Consequently, it might be considered an idea borrowed from the railroad where concrete or wooden piers are used for this purpose.

Mine cars pushed in a room are seldom spotted near the face by a mule driver or motorman. For this reason the miner is required to push the mine car within shoveling distance of the face. The result is that he must move the mine car and look to the braking simultaneously. Sometimes the mine car gets away from him, passing over the end of the track onto the bottom. If the working place is on the dip, this danger is most likely to occur. Frequently considerable time is lost in putting the mine car back on the track. A spotted mine car with brakes improperly set might run toward the face when on the dip, or away from the face when on the rise, endangering the life of the miner at the face in the first instance and the lives of those behind this miner in the latter case.



SAFETY BLOCK HOLDING CAR
Blocking the car in this manner makes mining work safer. Runaway cars always are a source of danger and frequently hold up the whole transportation system.



DESIGN OF WOODEN STOP
The shape of the block is such that it performs its function with the car on either side. There are no lefts and rights in this design.

These dangers are removed by fastening the safety block onto the ball of the rail on the grade end of the spotted car. Similarly, a block is placed to hold the truck of a shortwall mining machine. Where rooms are on the dip, a block located about 60 ft. from the face will derail a runaway mine car which might be placed carelessly behind a cutting crew at the face.

A. F. BROSKY.
Pittsburgh, Pa.

ACCORDING TO THE RAILROADS, what is needed for their going ahead is more backing up.—*Norfolk Virginian-Pilot.*

41,000,000 Tons of Bituminous Coal Stocked June 1, Largest Reserve Since March, 1922

Commercial consumers had in storage on June 1, 1923, approximately 41,000,000 tons of soft coal. This was an increase over stocks on March 1, 1923, of 5,000,000 tons, and is the highest level recorded since March, 1922, according to a report just issued by the Bureau of the Census, the Geological Survey, and the Federal Fuel Distributor. Strictly comparable records for corresponding dates are not available except for June 1, 1920, when stocks were at the lowest point on record. The supply on June 1, 1923, was more than twice as large as that three years before. The available data indicate that the tonnage on hand on June 1 probably was about the same as on June 1, 1921.

Measured in tons, stocks increased 13.9 per cent between March 1 and June 1. Measured in terms of days' supply, the increase was 36.4 per cent. The larger increase in days' supply is explained by the fact that the rate of consumption decreased perceptibly between March 1 and May 31. At the rate of consumption during that period stocks on June 1 were sufficient to last 30 days on the average. Such an average is based on the assumption that stocks were evenly divided. This is never the case, however, and it must be borne in mind that figures far above and far below the average are used in this report. In every locality there are consumers who store practically no coal, and others who usually have on hand a great deal more than the average tonnage.

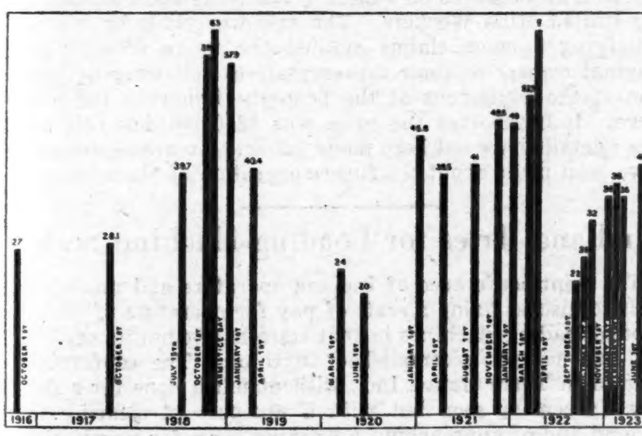


FIG. 1—TOTAL COMMERCIAL STOCKS OF BITUMINOUS COAL, OCT. 1, 1916, TO JUNE 1, 1923

Figures represent million net tons and include coal in the hands of railroads, industrial consumers, public utilities and retail dealers. Coal for steamship fuel, on lake docks, in transit and that in bins of householders is not included. The figures for 1923 are subject to revision.

Stocks on the Lake docks at Duluth-Superior and Ashland-Washburn on June 1, 1923, were 1,591,000 net tons. Complete records for the Lake Michigan docks are not available. A group of producers who store coal at the mines or at some intermediate point had 960,000 tons in storage on June 1.

Retail dealers in anthracite received more of that coal than they delivered in the three months preceding June 1, and their stocks on that date were 130 per cent larger than on March 1. The stocks on anthracite on the Lake docks at Duluth-Superior and Ashland-Washburn totaled 86 263 net tons. No data are available on stocks on Lake Michigan docks.

The total quantity of soft coal in the hands of commercial consumers on June 1, 1923, was between 39,000,000 and 43,000,000 net tons—probably 41,000,000 tons. This estimate does not take into consideration coal in the cellars of householders, concerning which no statistics are available, nor steamship fuel, nor coal an the Lake docks, which items are classed as coal in transit.

The accumulation of reserve stocks which had been in progress since the fall of 1922, and which had been temporarily halted in February, was resumed sometime after March 1. This increase was made possible partly through a perceptible decrease in consumption. The rate of consumption from March 1 to May 31 is estimated at approximately 1,500,000 tons per day. When compared with the rate in February, this was a decrease of 200,000 tons per day.

The average stocks for all consumers on June 1 were sufficient to last 30 days at the rate of consumption in March, April and May. At the rate of consumption in February, the stocks on March 1 would have lasted 22 days. The low record stocks on June 1, 1920, were sufficient for but 15 days at the current rate of consumption at that time.

Taking the country as a whole, the stocks held by general industrials were sufficient to last 39 days. This was an increase of 5 days over the supply on March 1. In comparison with dates on which stocks were large, the supply on June 1, 1923, was sufficient for 17 days less time than that on March 1, 1922, and 26 days' less than on Jan. 1, 1919. Information is not available for the corresponding date in 1921 but it seems evident that the tonnage on hand is larger than on that date even though the days' supply is smaller. This is explained by the greater rate of consumption at present.

Electric-utility plants' stocks on June 1 were sufficient for 45 days, against 34 days' supply on March 1. On June 1, 1920, such plants had enough coal to last but 22 days. Stocks at coal gas plants increased from a 58-days' supply on March 1 to 75 days' on June 1. This was nearly three and a half times the supply on June 1, 1920.

Practically complete returns from byproduct coke and steel plants indicated the following reserves on June 1 and March 1, 1923, which show no great change during the period from March 1 to June 1, 1923:

BYPRODUCT PLANTS	Days' Supply June 1, 1923	Days' Supply March 1, 1923	STEEL WORKS	Days' Supply June 1, 1923	Days' Supply March 1, 1923
Low volatile...	21	17	Steam coal....	27	23
High volatile..	24	19	Gas coal	31	30
Average	23	19	Average	29	26

The total quantity held by the railroads in stockpiles, cars and chutes on June 1 was 8,500,000 tons, a supply sufficient for 21 days. In comparison with March 1 this was an increase in days' supply of approximately 31 per cent.

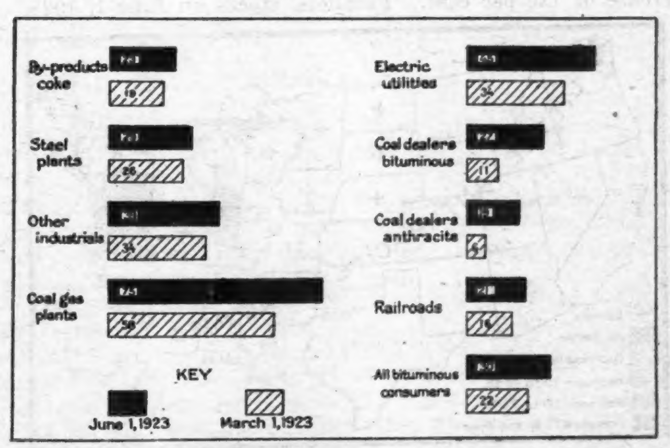


FIG. 2—DAYS' SUPPLY HELD BY DIFFERENT CLASSES OF CONSUMERS ON JUNE 1, 1923, AND MARCH 1, 1923

At the rate soft coal was burned from March 1 to May 31, 1923, the stocks on June 1 were sufficient to last 30 days. The stocks on March 1 were sufficient to last 22 days at the rate of consumption in February. Two factors in the increase in the reserve on June 1 were a normal seasonal decline in some industries and curtailment of operations in others. The supply on June 1, 1923, was sufficient for 15 days more time than that on June 1, 1920, when stocks were at the lowest point on record.

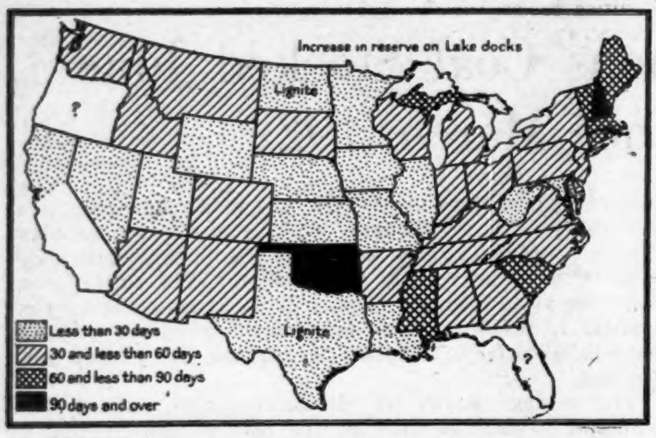


FIG. 3—DAYS' SUPPLY OF SOFT COAL ON HAND AT INDUSTRIAL PLANTS ON JUNE 1, 1923

At the average rate of consumption that prevailed from March 1 to May 31, 1923, reserve stocks at industrial plants other than steel and byproduct coke would last on the average 39 days. The map shows how the supply varied from state to state. Changes in business activity which affect coal consumption are quickly reflected in the days' supply. Decreased consumption after March 1 increased the days' supply on that date, based on February consumption, from 34 to 37 days. Based on reports from 2,194 plants.

Deliveries of bituminous coal by retail dealers decreased sharply after March 1, the average daily rate during March, April and May being but little more than half that in February. On June 1, 1923, retailers had a supply sufficient to last 27 days at the rate of delivery during the three months preceding, against 11 days' supply on March 1. The days' supply on June 1, 1923, was practically the same as on April 1, 1921. The unusual demand for bituminous coal for household use in the territory which ordinarily burns anthracite continued during most of March, but ceased with arrival of warm weather.

The quantity of unbilled coal in cars standing at the mines increased from 183,000 tons on March 1 to 421,000 tons on June 1. The tonnage at junction points and terminals awaiting reconsignment decreased from 43,000 to 36,000 tons.

Stocks of byproduct coke increased 132 per cent during the period March 1-May 31, and the quantity on hand June 1 was 202,000 tons. In spite of this large increase the supply on June 1 was less than one-fourth that on March 1, 1922, when the reserve was heaviest.

Unseasonably cold weather during March and April maintained the demand for anthracite at a high level, and retailers were given but little opportunity to accumulate reserve supplies during that time. On June 1, 1923, stocks in the hands of 413 retail dealers totaled 668,491 net tons, against 290,852 tons on March 1, 1923. This was an increase of 130 per cent. Retailers' stocks on June 1, 1923,

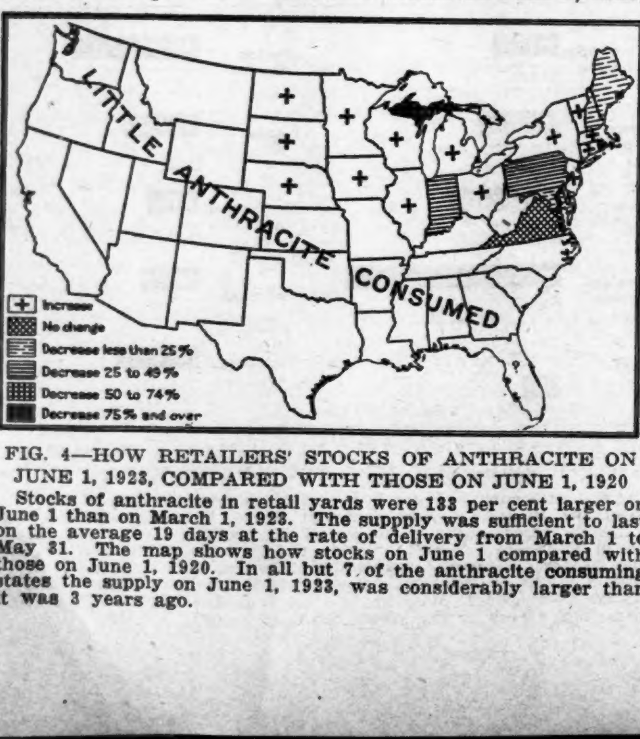


FIG. 4—HOW RETAILERS' STOCKS OF ANTHRACITE ON JUNE 1, 1923, COMPARED WITH THOSE ON JUNE 1, 1920

Stocks of anthracite in retail yards were 133 per cent larger on June 1 than on March 1, 1923. The suppply was sufficient to last on the average 19 days at the rate of delivery from March 1 to May 31. The map shows how stocks on June 1 compared with those on June 1, 1920. In all but 7 of the anthracite consuming states the supply on June 1, 1923, was considerably larger than it was 3 years ago.

were 40 per cent less than on March 1, 1922, 44 per cent less than on April 1, 1921, and 22 per cent more than on June 1, 1920. Measured in terms of days' supply, retailers' stocks of anthracite on June 1, 1923, were sufficient to last 19 days at the average rate of delivery from March 1, against a 10 days' supply on March 1, 1923, at the rate of delivery in February.

Available information indicates the probability that producers have little, if any, domestic sizes of anthracite on hand.

Rail Brotherhood Agrees to Unionize Mine

The miners' union appears to have browbeaten the Brotherhood of Locomotive Engineers. In a conference at Chicago last week it was decided to permit the unionization of the Lick Creek mine in Boone County, West Virginia, which has been operated on an open-shop basis by the Brotherhood. Warren S. Stone, for the Brotherhood, general manager of the Coal River Collieries, as well as the United Mine Workers conferees and J. C. Lewis, president of the Iowa Federation of Labor, who acted as arbitrator, declined, after the meeting, to make public the exact nature of the agreement. Mr. Stone did say, however, that "no objection would be advanced" to the miners in the Brotherhood property unionizing. The mine several weeks ago was declared by the miners' organization to be in a state of strike though most of the men working in it did not belong to the union.

Miners Buy Herrin Massacre Strip Mine

The strip mine near Herrin, Ill., around which centered the Herrin massacre of June 21, 1922, has been bought by the United Mine Workers. The sale was made by way of satisfying damage claims against the union filed by the original owners or their representatives following destruction of the equipment at the property following the mine siege. It is reported the price was $250,000, but this and other details have not been made public. No announcements have been made about the future operation of the mine.

Indiana Tries for Loading-Machine Scale

The joint conference of Indiana operators and union officials to discuss fixing a scale of pay for operators of underground loading machines in that state has begun its sessions but has not yet accomplished anything. The conferences started in Terre Haute, Ind., without much hope for a definite agreement soon but with a prospect of clearing the ground and of approaching a working basis for negotiation. The three operator conferees are Phil Penna, J. B. Pauley and Paul Zimmerman. For several months loading machines have been working in three mines. Machine operators have received $12 a day, but the theory is that development work is their main activity. Mine owners consider it hopeful that the union is now ready even to discuss the question of fixing a scale for room loading.

Illinois Operators' Associations May Unify In Relations with Labor

The three operators' associations of Illinois scheduled a joint meeting in Chicago for Wednesday, July 11, to consider several matters, including the proposal to unify in their relations with labor. It is possible a single board to represent the entire state will be set up to supplant the three boards which now meet the miners in joint conference over disputes arising under the labor contract. Also there is much conversation over a proposal to employ a single labor commissioner for the state, though nobody has yet been able to suggest a man who could be had for the job who would be acceptable to the various operator groups. Also at the meeting the men who attended part of the National Coal Association convention in Atlantic City will report their observations. A strong effort is being made to induce the Illinois operators to rejoin the National.

I. C. C. Declares Ohio Coal Rates Too High; Readjustment Ordered Sept. 27

On July 3 the Interstate Commerce Commission handed down its findings on the Ohio-West Virginia rate case, virtually giving the decision to Ohio. The carriers are directed to readjust differentials to Michigan points between Ohio mines and those in the so-called crescent group of West Virginia, increasing the spread from 40c. to 50c. per ton in the inner crescent and from 60c. to 75c. in the outer crescent. The decrease does not apply to Lake cargo coal.

The rates from Ohio mines to affected territory are to be reduced 10c. and from the outer crescent to be increased 5c., the inner crescent rates to remain unchanged.

The commission made its decision effective Sept. 27 in an order for the readjustment of both sets of rates, reducing those from Ohio and increasing those from the Southern districts.

Commissioners McChord, Potter, Cox and Campbell handed down separate opinions, concurring in the general conclusions of the majority report submitted by Commissioner Esch, but challenging it on the ground that the majority does not go far enough in the one matter of differentials in the rates from the inner and outer crescents over those from southern Ohio.

Southern Ohio, in the opinion of Commissioner McChord, is as fully entitled to the advantage of her geographic position now as when the 40c. differential was fixed with relation to the rate of $1 from southern Ohio.

"That territory's rate advantage," said Mr. McChord, "expressed in terms of the percentage relationships, is less favorable now than when the differential relationship was fixed. I am convinced that at this time the rates from the crescents should be 60 to 90c. respectively, higher than from southern Ohio. So adjusted, taking the key rate to Toledo with the appropriate reduction from southern Ohio for the purpose, the relationships would then be for southern Ohio 100 per cent, inner crescent approximately 133 per cent, and outer crescent approximately 150 per cent."

The dissenting opinion of Commissioner Potter is particularly striking. His conclusions approximately concur with those of Commissioner McChord but Mr. Potter insists that the rate-making theory should be so modified as not to encourage unnatural long-haul development and operation but to promote the short hauling of coal.

"There is an opportunity," said Commissioner Potter, "through the medium of the rate structure to reduce the average haul, increase efficiency in the use of carrier equipment, reduce carrier costs, bring about available surplus of transportation facilities without increase of carrier investment, concentrate mining labor so as to permit continuous operation, provide steady employment of labor on a basis better for labor, producer and consumer, accomplish an available market surplus of coal and reduce mining costs and coal prices.

"It is quite possible that by this means there could be a direct saving of from $500,000,000 to $750,000,000 a year in the price of coal to the consumer, with much additional indirect saving through lower rates and reduced manufacturing costs.

"It is gratifying to know that certain prominent carriers are appreciating that endeavor should be made to eliminate long hauls in the coal traffic. These considerations tend to justify increasing the differential in this case to an extent that, at least, will restore the original normal relation."

Commissioner Potter contends that the Interstate Commerce Commission made a mistake when, some time ago, it allowed an increase out of line with the increase from the crescents to the extent of 30c. a ton on coal.

"The increase in the spread between rates from Ohio mines and those remote," declared Commissioner Potter, "incident to correcting the differential relation, will encourage resort to short hauls in supplying consumers' demands and make for cross-haul elimination and more efficient use of transportation.

"Long hauls make for congestion, high costs and inefficient service and are giving too serious import to the transportation problem. Correct adjustment should enable communities to be less interdependent and more nearly self-sustaining. Artificial adjustments should be modified where consistent with regard for interests entitled to preservation. Change of the differential, as proposed, would be helpful to these ends."

In the opinion of Commissioner Potter the general bituminous coal situation has an aspect which should have influenced the Interstate Commerce Commission in this case.

Lewis Orders Nova Scotia Strikers Back; Livingstone "Scorns" Command

Charging that the strike of 9,000 coal miners in Nova Scotia is "unquestionably a violation of the existing agreement between District 26 and the coal companies" and a violation of the principles and policies of the United Mine Workers, John L. Lewis on July 7 instructed Daniel Livingstone, president of District 26, to take immediate steps to put the men back to work. Miners are on strike as a protest against the calling of Nova Scotia militia in a dispute between neighboring steel workers and their employers.

Dan Livingstone is reported to have "scorned" the telegraphed command of Lewis that the strikers be ordered back to work. "District 26 is absolutely autonomous," was his reported comment on the order, "and it isn't accepting dictation from John L. Lewis or anybody else."

MacLachlan's opinion of the telegram was that "It constitutes thunder, but there is no lightning back of it."

The crown intimated in court July 9 that new criminal laws adopted after the general strike in Winnipeg in 1919 might be brought to bear against Dan Livingstone and James D. MacLachlan, district leaders of the United Mine Workers, charged with circulating false tales. It is alleged that in asserting the police and soldiery had been guilty of brutality, the defendants published "a seditious libel concerning His Majesty's Government of and for the Province of Nova Scotia, and the provincial police."

Miners in the Westville, Thordun and Stellarton sections of district 26 voted Monday night for a 100 per cent strike in support of their demand for liberation of Livingstone and MacLachlan.

ATLANTIC CITY, N. J., July 9—According to a press dispatch John L. Lewis today received a telegram from Daniel Livingstone stating that he had called a meeting of the executive board of the union tomorrow to act upon Lewis' instructions to end the coal strike there. Lewis today wired Alexander McIntyre, vice-president of the district, to carry out the instructions contained in the telegram to Livingstone, who is in jail.

48,824,127 Tons of Anthracite Produced In 1922, Valued at $273,700,125

Production of Pennsylvania anthracite in 1922, according to statistics released by the Geological Survey on July 7, was 48,824,127 gross tons, with a total value of $273,700,125. The value given, it is stated, is the value at which the coal left possession of the producing companies f.o.b. the mines, and does not include the margin of separately incorporated selling companies.

The total quantity of fresh-mined coal was 45,073,602 gross tons, valued at $262,798,641; of washery product, 2,943,286 gross tons, valued at $9,911,775; and of dredge product 807,239 gross tons, valued at $989,709.

Commercial shipments were 41,073,838 tons, local sales 2,123,393 tons and the quantity used for power and heat at the mines was 5,626,896 tons.

The Wyoming region contributed 25,802,944 gross tons, valued at $155,261,102; the Schuylkill region followed with 16,056,992 tons, valued at $79,910,415; of the total the Lehigh region supplied 6,716,137 tons, valued at $37,327,244, and Sullivan County produced 248,054 tons, valued at $1,201,364.

Editorial Comment in Eastern Press Approves Anthracite Report

Commentators Impressed with Public Interest in Coal Mining and Declared Necessity for Publicity for Costs, Prices and Profits

Two things in the Coal Commission report on anthracite appear above all others to have caught the eye of editorial writers on the New York and Philadelphia dailies, whose comment is on hand as this issue of *Coal Age* goes to press. The first has to do with the public interest in coal mining and the second with the necessity of publicity for costs, prices and profits. The New York *Evening Post* finds that, superficially at least, the most dramatic feature of the report is that providing "power for the President to declare a state of emergency in the event of a cessation of anthracite mining and to take over the operation of the industry." The *Post* thinks that actually this recommendation would "only give formal sanction to a power accepted as inherent in the President." In this connection the New York *Times* notes that "this power has been claimed for the President as inherent in his office, but legislation by Congress is to be preferred to an interpretation of the Constitution that may be opposed and challenged."

Private Monopoly of Key Industry Intolerable

Citing the strike of 1902 and again that of 1922, the *Tribune* concludes that "arbitrary and private control of a monopolized key industry is intolerable. Mr. Lewis and the operators proved this last year. They ought not to have an opportunity to prove it again. The recommendation of presidential intervention goes to the heart of the hard-coal problem so far as the interruption of supply is concerned." The *Evening Star* of Washington thinks that recommendations of the Commission "will appeal to the ultimate consumer as a drop of cool water to a wanderer in the desert." The Philadelphia *Record* finds that "a business that is so thoroughly monopolized as this, and where consumers are threatened with freezing when the railway monopoly and the labor monopoly are dickering for terms, is evidently one that cannot be left to itself." The Philadelphia *Inquirer* hopes "that such an emergency will never arise," as it will cause the President to declare "that a national emergency exists and to take over and operate the mines and determine the proper wages and prices."

Adds Coal to Category of Public Utilities

Under the caption "Coal a Public Utility" *The Sun and the Globe*, of New York, notes that the Commission's "entire work is colored by one idea, expressed clearly, that as with railroads and banks so with coal. The Commission, in other words, adds coal to the list of public utilities." This, that paper thinks, to most Americans will now seem a simple and natural act. The *Inquirer* says that the "Commissioners are here treading on safe ground, for they distinctly repudiate government ownership." The Philadelphia *Public Ledger* is glad that the industry is to lose its shadow of mystery and sees the "outlines of an Interstate Coal Commission" looming large in the report, while the *Evening Post* notes that for the moment we are "not to go as far as the actual fixing of prices." That paper believes that if publicity of the kind recommended by the Commission should not prove an effective remedy against price boosting, it is then "inherent in the Commission's report that the second step should be taken," which step, involving price fixing, "is something which neither the operators nor employees will hasten to bring upon themselves."

The New York *World* believes that "the case for publicity is even more complete than that for regulation. With publicity, the public can take care of itself. When consumers know what profits are realized and what combinations of railroads and mining companies are reaping excess rewards, they will soon insist on regulatory measures where they are most needed."

"The Coal Commission is speaking under great restraint when it describes the anthracite business 'as a limited natural monopoly,'" notes the Philadelphia *Record*, which adds that there is, furthermore, "a monopoly in the supply of labor." The anthracite business, according to the Brooklyn *Daily Eagle*, "has been run on the principle of a Coney Island concession," with the landowners, operators, miners, railroads, wholesalers and retailers "scrambling for all the profits the traffic will bear." Continuing, the *Eagle* says, "most of these facts were known before, but the Coal Commission has gone a little deeper than any other previous inquiry."

It seems to be quite generally the opinion of the press that, as stated by the Boston *Daily Globe*, "public opinion will give full approval" to the main recommendations of the Commission, and the Washington *Star* believes that "the temper of Congress would scarcely be uncertain when it comes to dealing with the coal situation." If Congress balks, the Brooklyn *Eagle* would find this "a confession of its utter incapacity to deal with an urgent problem." New England, according to the Boston *Post*, is going to be "especially concerned with the recommendations that the President may seize and operate the mines in the event of a tie up."

There is quite general approval of the Commission's stand against nationalization and government ownership or operation. The New York *Evening Mail* notes that the report "wisely does not go so far as those who recommend government ownership of the mines." The New York *Journal of Commerce* believes that "it would not be well to attempt final judgment" upon this report of the Coal Commission until the full text of the document has been scrutinized or until the bituminous coal report is available. But there are nevertheless "a few facts which should be brought most forcibly to the attention of the public." Among others this paper cites the fact that "on the side of labor absolutely no competition remains" and that "nothing is to be gained and much lost by nationalization of the mines."

Not so much interest as might have been expected was displayed in the matter of prices. The New York *Tribune* picks up the fact that "profits have increased nearly 300 per cent" in ten years and that "coal prices are far out of line with the average of increases in commodity prices since 1913," which is a fallacy shared by a number of editorial writers and one on which the Commission report itself is by no means as clear as it should be. The *Evening Post* quite fairly states: "Let it be said at the beginning that the Commission's figures do not bear out the wild charges of profiteering so regularly flung out in heat of controversy." This paper notes that the increases in retail coal prices in New York "range very close to the general index of cost increases since the war," which prices, continues the *Post*, "might, however, be lower by a perceptible degree—and the perceptible degrees count for the average consumer."

Wants Fat and Lean Mines Grouped for Average

The New York *Herald* strikes the only discordant note in the editorials reviewed on this page. "The report of the U. S. Coal Commission on the anthracite situation is weak because of its failure to deal directly with the underlying problem of the coal industry. As far as the Commission was willing to go, its work is useful, but it was too cautious." The *Herald* points out that the purchaser of coal is interested chiefly in price and in quality and its criticism of the Commission's report is that merging of the operating companies was not recommended as a means to further stabilize price and quality. The *Herald* is opposed to government ownership but it does want the "fat and lean mines" grouped so that the cost of production should be averaged. Although the Commission has been "too timid in dealing with the fundamentals of the industry" the *Herald* conceives that its "methods of careful, scientific inquiry have been admirable and in the final report ought to lead to conclusions of general advantage to the country." The New York *Times* believes that "in the light of this strong report the operators and miners will have no excuse for bickering over wage terms and conditions of labor nor will Congress be sustained by the people if it fails to enact regulatory laws."

Anthracite Wage Conference Shatters Precedents; Two of Eleven Demands Granted

Precedents in a number of important aspects have been shattered at the Atlantic City conference between the United Mine Workers and the anthracite operators. The public and the press have been admitted to the general sessions. A miner instead of an operator is chairman, for on motion of Mr. Warriner, John L. Lewis was selected for that position. And then on July 9, four days after the conference began, the operators granted off-hand, without any attempt at trading, two of the eleven demands of the miners.

Never before has a wage conference in the coal industry begun its work better fortified with the facts of its industry. On Saturday night, July 7, both sides were in possession of mimeograph copies of the anthracite report of the President's Coal Commission and in addition volumes of detailed statistics of earnings of practically all the men in the industry.

At the first meeting on July 6 at the Hotel Ambassador in Atlantic City, John L. Lewis and, in turn, Golden, Kennedy and Brennan, three district presidents of the anthracite mine workers, presented in full the eleven demands framed by the Tri-District convention of the union in Scranton the previous week. Their presentation, together with their arguments, occupied the entire first day and was so voluminous that the official reporters were not able to transcribe the speeches until late on Saturday. For this reason there was no session on Saturday or Sunday in order to give the operators opportunity to study the arguments of the union men and prepare their reply.

Warriner Waives Twelve-Hour Day

On Monday S. D. Warriner, president of Lehigh Coal & Navigation Co., chairman of the Policies Committee of the anthracite operators and spokesman for the committee of twenty-five operators, made his reply to the demands of the mine workers. He conceded two of the demands, that for abolition of the twelve-hour day and the requirement that the umpire of the Anthracite Board of Conciliation render decision within thirty days. With reference to the abolition of the twelve-hour day he said:

"We are entirely conscious that the idea that a man should be required to work a twelve-hour day is not deemed compatible with what we call our 'American standards.' We feel elimination of this practice is dear to your hearts and that public feeling considers it out of date. In the coming sessions of the sub-committee we are ready to work out with you a plan of reorganization satisfactory to both sides by which this practice may be eliminated."

Increases in wages, however, Mr. Warriner deemed unjustified. He said he had looked in vain in the coal commission's report to find any refutation of his belief that present wages in the anthracite mines were adequate to meet present conditions.

"While wages in our fields are wages of which we can mutually be proud," Mr. Warriner said, "we don't mean at all that our ideas are fixed. We are open to conviction and argument, but we can't refrain from giving you the benefit of our business training in the handling of this industry."

Mr. Warriner asked the conference to adopt a resolution pledging that, "To allay public apprehension, we announce that if the completion of negotiations should be delayed beyond Sept. 1, the mines shall nevertheless be continuously operated." He cited "a recent letter from the President of the United States to the U. S. Coal Commission, and another letter from the commission to the operators admonishing us in no uncertain terms that the public must be protected from another stoppage."

The resolution was defeated following a rejoinder by John L. Lewis, the miners' leader and chairman of the conference, in which he said that delaying completion of the negotiations until after Sept. 1, when the present contract expires, could only serve to increase public apprehension and cause a "runaway market," with higher prices for anthracite. The miners, Mr. Lewis said, joined with the operators "in the desire for a prompt adjudication of the issues before us."

"We are here to relieve the public mind and to get a contract," said Mr. Golden. "We have ample time, if we apply ourselves to the work of negotiating a contract, to reach an agreement that will assure the public not only of a supply of coal but of the price it will have to pay."

Mr. Warriner served notice that he would bring the matter up again in sub-committee.

Continuing, Mr. Warriner said: "I would emphasize our desire to co-operate with you in a full study of those labor conditions that may have developed into controversy and running sores, to the end that we may have harmony and cordiality as well as peace in our industry. We pledge ourselves to do that."

The anthracite industry was not a "limited monopoly" as the coal commission had defined it, he said, because of the competition of producers of hard-coal substitutes, such as bituminous coal, gas and fuel oil.

Nevertheless, Mr. Warriner indicated, this was not necessarily the last word in scale negotiation.

Mr. Kennedy presented a resolution asking that the conference demand an investigation of printed statements made by George Cushing, declaring that Attorney General Daugherty caused the rewriting of part of the coal commission's report dealing with labor-policy recommendations for the anthracite fields.

"In view of the publicity given these astounding charges," read the resolution, "the true facts must be ascertained if the distinguished members of the U. S. Coal Commission are to retain the confidence and respect of the American people. Mr. Cushing should be required by competent authority either to substantiate his most serious charges or make public disavowal and retraction thereof."

On presentation of the resolution the operators could not concur in it, "as we believe it an impugnment of the commission and its individual members."

Mr. Lewis denied there was any such motive in the resolution, but insisted that "steps be taken to have the veracity of the statements set forth, so we may fully understand their nature."

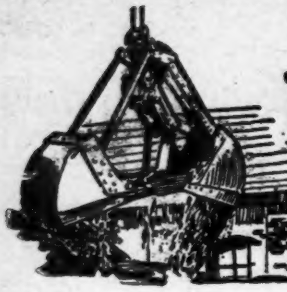
When the question was put all the miners voted "aye" and the operators "no," and as is customary in such cases the motion was declared lost.

John Hays Hammond, chairman of the coal commission, according to the *New York Herald*, bitterly attacked the allegations of George Cushing, saying: "The subject has never been discussed with Attorney General Daugherty, nor has he seen the draft of the report. Furthermore, neither the President nor the Attorney General has made a single suggestion as to the recommendations to be made by the commission. Every recommendation in the report received the unanimous approval of the commission."

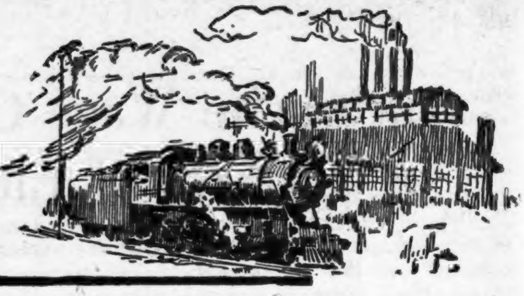
Dr. Charles P. Neill declared that the statements made by Cushing were "absolutely false," and Thomas R. Marshall said the Cushing allegations were without foundation and "too ridiculous" to be dignified with formal denial, according to the *New York Times*.

Negotiations will be carried on this week by a subcommittee of eight, four—John L. Lewis and the three district presidents—representing the miners, and four operators.

Extra copies of the full text of the U. S. Coal Commission's report on the anthracite industry, contained in this issue of Coal Age, *may be had at cost upon addressing the New York office of* Coal Age.



Production and the Market



Weekly Review

With stocks of bituminous coal in the hands of commercial consumers now in excess of 42,000,000 tons, as is indicated by the government's stock report showing 41,000,000 tons on June 1, and with production holding up to 10,500,000 tons per week, there is no occasion for surprise that prices of soft coal are continuing their downward movement. The government figures indicate that the rate of consumption of soft coal is now approximately 9,500,000 tons per week, that 500,000 tons is being exported each week, mainly to Canada, and that approximately 500,000 tons is going into storage out of the current production of 10,500,000 tons.

Prices of bituminous coal continue their decline, *Coal Age* Index of mine prices recording a drop of 6 points to 197 on July 9. The average spot price is now $2.38, a drop of 8c. in one week and of 35c. in the past nine weeks.

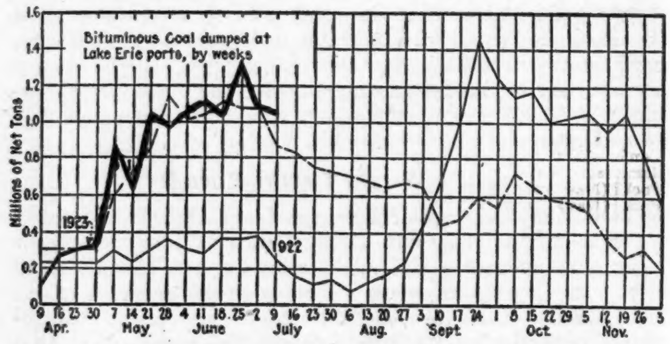
The Federal Fuel Distributor in Washington has just issued a lengthy statement reviewing conditions in all soft-coal producing fields, pointing out the transportation and labor supply are ample and current prices at or below production cost. He also issued a statement to the press urging consumers to buy and store more coal this summer if they would avoid transportation tie-up and higher prices next fall and winter.

With the present rate of production maintained during July and August the country is certain to go into the fall and winter season with a plentiful supply of coal where it is most needed when the railroads are called upon to divert their motive power and facilities to the transportation of grain and other fall products. With between 45,000,000 and 50,000,000 tons of bituminous coal in the hands of commercial consumers and with the docks in the Northwest stocked with coal by the end of summer nothing short of calamity can bring about a sellers' market this winter.

The strike of the Nova Scotia miners brought in several Canadian inquiries and a few sales of high-volatile coal. Inquiries also were received from European and South American houses. During June total dumpings for export at Baltimore were 326,745 tons.

The Coal Commission's report on anthracite reached the operators and miners in conference at Atlantic City last Saturday evening. Both sides found in the first reading points to which they take marked exception, the operators because the Commission recommends that the President be given power to take over the mines in national emergencies and the miners because the Commission would compel them to arbitrate their disputes and would prevent their striking. The public is yet to be heard from.

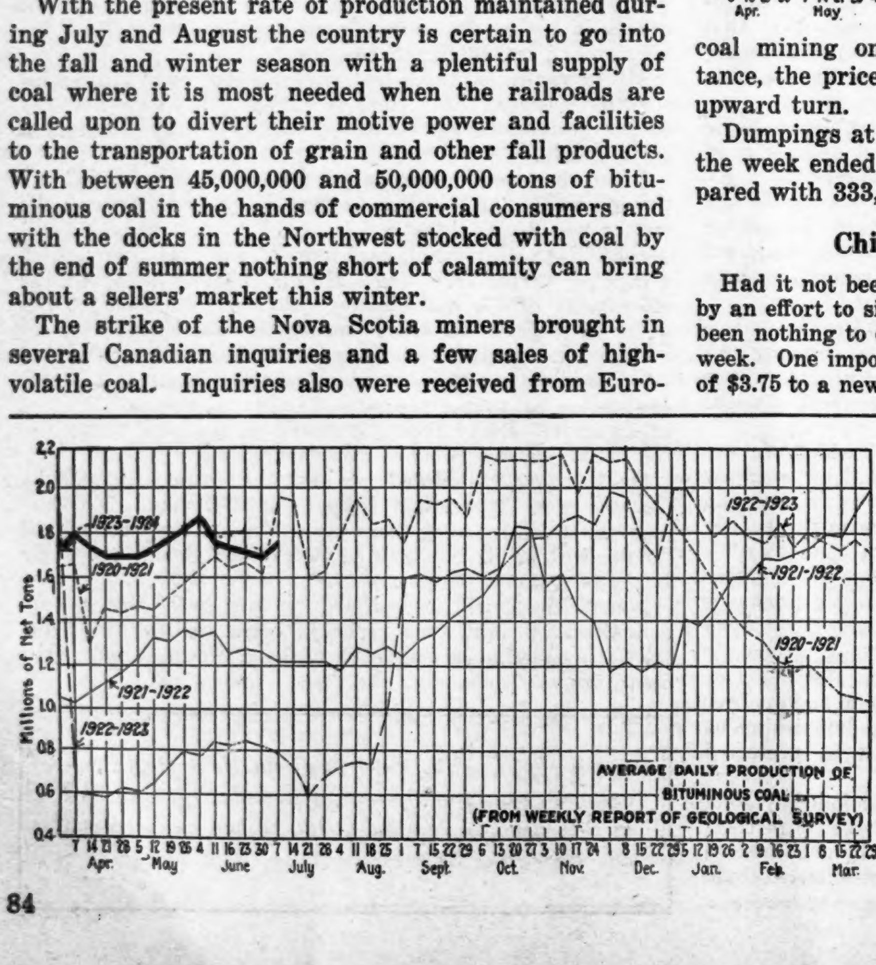
Although every day that the negotiations are on at Atlantic City the prospects of a suspension of hard coal mining on Sept. 1 recede farther into the distance, the price of independent coal has taken another upward turn.



Dumpings at Hampton Roads for all accounts during the week ended June 30 were 355,961 net tons, as compared with 333,870 tons the previous week.

Chicago Market Still Lifeless

Had it not been for a little interest in smokeless created by an effort to sink the price of mine run there would have been nothing to enliven the Chicago coal market during the week. One important shipper dropped the price from a low of $3.75 to a new low of $3.25 and claimed to draw business



Estimates of Production
(Net Tons)

	1922	1923
BITUMINOUS		
June 16 (*b*)	5,013,000	10,573,000
June 23 (*b*)	5,363,000	10,422,000
June 30 (*a*)	5,226,000	10,609,000
Daily average	871,000	1,768,000
Calendar year	187,850,000	273,423,000
Daily av. cal. year	1,216,000	1,775,000
ANTHRACITE		
June 16	22,000	2,053,000
June 23	24,000	2,042,000
June 30	25,000	2,087,000
Calendar year	21,926,000	51,374,000
COKE		
June 23 (*b*)	110,000	413,000
June 30 (*a*)	114,000	399,000
Calendar year	3,217,000	10,069,000

(*a*) Subject to revision. (*b*) Revised from last report.

in spite of the fact that nobody wants smokeless. The others tried to stall off this move by declining to do business at $3.25.

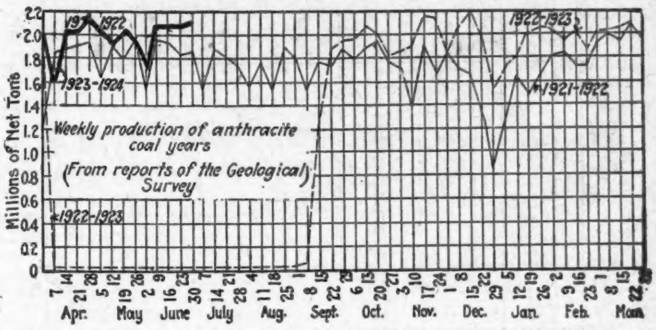
A large proportion of Illinois screenings that have been clogging mine tracks throughout the state have been unloaded at low prices. Domestic sizes are selling at all sorts of prices from $3 up, while producers look forward for a strengthening of demand within two or three weeks.

Slow production gets continually slower in the Illinois fields. Railroad storage coal is easing off in the south fields making all sizes harder to move. In the Mt. Olive region the tonnage of steam sizes is sold up on contract and domestic is hard to move.

Warm weather seems to have killed St. Louis business, where a little apartment-house and school coal has been going in steadily. Steam business is not picking up even though very little lump is being made in the fields shipping to that city. Householders display no interest in anthracite in spite of a price jump of 25c. retail and a warning of shortage in case of a strike.

Kentucky Salesmen Work Harder

Kentucky producers realize now more than ever that they must have effective selling organizations. They are drawing



back good men released during easier times and a general high-pressure effort is noticeable. Demand has fallen flat for almost every kind of Kentucky coal and there continues a general closing down among plants not equipped to prepare their output properly. The embargo against lake shipments to Toledo compresses the market painfully and has resulted in cheap coal enough to produce demoralizing conditions.

The bituminous coal market at Duluth remains weak. Old screenings are offered as low as $3.75. New screen-

Current Quotations—Spot Prices, Bituminous Coal—Net Tons, F.O.B. Mines

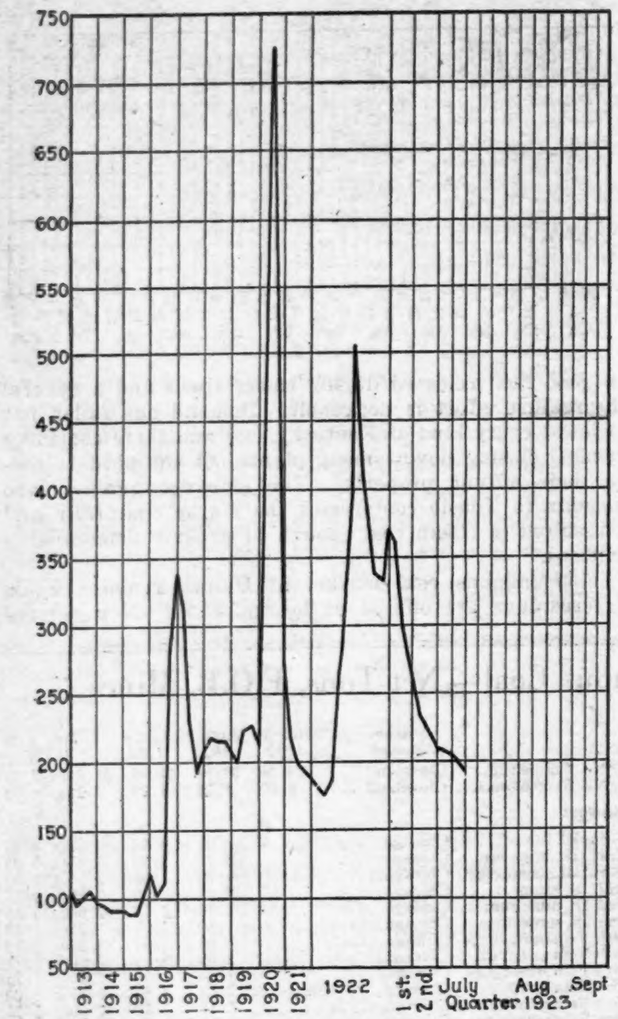
Low-Volatile, Eastern	Market Quoted	July 10 1922	June 25 1923	July 2 1923	July 9 1923†
Smokeless lump	Columbus	$3.65	$6.10	$5.85	$5.75@ 6.00
Smokeless mine run	Columbus	3.45	3.60	3.60	*3.00@ 3.50*
Smokeless screenings	Columbus	3.25	3.60	3.35	*3.00@ 3.25*
Smokeless lump	Chicago	3.65	6.10	6.10	6.00@ 6.25
Smokeless mine run	Chicago	3.45	3.85	3.75	*3.25@ 4.00*
Smokeless lump	Cincinnati	3.75	6.00	6.25	*6.00*
Smokeless mine run	Cincinnati	3.50	3.50	3.35	**3.25@ 4.00**
Smokeless screenings	Cincinnati	3.25	3.25	3.00	**2.75@ 4.00**
*Smokeless mine run	Boston	6.35	5.60	5.60	*5.25@ 5.50*
Clearfield mine run	Boston	3.50	2.35	2.35	*2.00@ 2.50*
Cambria mine run	Boston	4.00	2.85	2.85	2.50@ 3.25
Somerset mine run	Boston	3.65	2.60	2.60	*2.25@ 2.75*
Pool 1 (Navy Standard)	New York	.....	3.75	3.60	*3.25@ 3.75*
Pool 1 (Navy Standard)	Philadelphia	.....	3.65	3.60	*3.25@ 3.90*
Pool 1 (Navy Standard)	Baltimore	.....	.....	.....	.....
Pool 9 (Super. Low Vol.)	New York	4.40	2.75	2.80	*2.50@ 3.00*
Pool 9 (Super. Low Vol.)	Philadelphia	4.70	2.85	2.80	*2.45@ 3.00*
Pool 9 (Super. Low Vol.)	Baltimore	4.40	2.75	2.60	2.50@ 2.75
Pool 10 (H.Gr.Low Vol.)	New York	4.25	2.50	2.45	*2.25@ 2.50*
Pool 10 (H.Gr.Low Vol.)	Philadelphia	4.45	2.25	2.20	**2.15@ 2.40**
Pool 10 (H.Gr.Low Vol.)	Baltimore	4.40	2.45	2.25	2.15@ 2.35
Pool 11 (Low Vol.)	New York	4.05	1.95	2.05	*1.60@ 2.00*
Pool 11 (Low Vol.)	Philadelphia	4.25	1.90	1.85	1.70@ 2.00
Pool 11 (Low Vol.)	Baltimore	3.90	2.25	2.05	2.00@ 2.10
High-Volatile, Eastern					
Pool 54-64 (Gas and St.)	New York	3.90	1.80	1.80	*1.60@ 1.75*
Pool 54-64 (Gas and St.)	Philadelphia	3.65	1.70	1.60	*1.40@ 1.75*
Pool 54-64 (Gas and St.)	Baltimore	3.90	1.75	1.75	1.75
Pittsburgh sc'd gas	Pittsburgh	.....	2.80	2.80	*2.25@ 2.60*
Pittsburgh mine run (St.)	Pittsburgh	.....	2.05	2.05	*1.90@ 2.00*
Pittsburgh slack (Gas)	Pittsburgh	.....	1.50	1.50	1.50
Kanawha lump	Columbus	3.65	3.00	3.00	2.75@ 3.25
Kanawha mine run	Columbus	3.40	1.85	1.85	1.75@ 2.00
Kanawha screenings	Columbus	3.15	1.35	1.25	*1.00@ 1.20*
W. Va. lump	Cincinnati	3.90	3.25	3.50	*3.00@ 3.50*
W. Va. Gas mine run	Cincinnati	3.90	1.75	1.85	*1.50@ 2.00*
W. Va. Steam mine run	Cincinnati	3.75	1.75	1.85	*1.50@ 2.00*
W. Va. screenings	Cincinnati	3.35	1.10	1.25	*1.00@ 1.10*
Hocking lump	Columbus	3.65	2.75	2.75	2.50@ 3.00
Hocking mine run	Columbus	3.40	1.85	1.85	1.75@ 2.00
Hocking screenings	Columbus	3.20	1.20	1.25	1.20@ 1.30
Pitts. No. 8 lump	Cleveland	4.25	2.70	2.55	**2.15@ 3.00**
Pitts. No. 8 mine run	Cleveland	$4.00	$1.90	$1.95	*$1.80@$2.00*
Pitts. No. 8 screenings	Cleveland	4.00	1.25	1.25	1.20@ 1.35
Midwest					
Franklin, Ill. lump	Chicago	.....	4.05	3.90	3.50@ 4.35
Franklin, Ill. mine run	Chicago	.....	3.10	3.00	2.75@ 3.25
Franklin, Ill. screenings	Chicago	.....	1.80	1.65	1.50@ 1.85
Central, Ill. lump	Chicago	.....	2.60	2.60	2.50@ 2.75
Central, Ill. mine run	Chicago	.....	2.10	2.10	2.00@ 2.25
Central, Ill. screenings	Chicago	.....	1.60	1.35	1.25@ 1.50
Ind. 4th Vein lump	Chicago	.....	3.35	3.35	3.25@ 3.50
Ind. 4th Vein mine run	Chicago	.....	2.60	2.60	2.50@ 2.75
Ind. 4th Vein screenings	Chicago	.....	1.80	1.60	1.50@ 1.75
Ind. 5th Vein lump	Chicago	.....	2.85	2.85	2.75@ 3.00
Ind. 5th Vein mine run	Chicago	.....	2.10	2.10	2.00@ 2.25
Ind. 5th Vein screenings	Chicago	.....	1.55	1.45	1.40@ 1.50
Standard lump	St. Louis	.....	2.25	2.25	**2.25@ 2.50**
Standard mine run	St. Louis	.....	1.75	1.75	**1.85**
Standard screenings	St. Louis	.....	1.35	1.20	*1.10@ 1.20*
West Ky. lump	Louisville	4.75	2.25	2.25	2.15@ 2.35
West Ky. mine run	Louisville	4.90	1.75	1.75	*1.50@ 1.85*
West Ky. screenings	Louisville	4.90	1.15	1.15	*1.10@ 1.25*
West Ky. lump	Chicago	5.05	2.35	2.40	2.25@ 2.55
West Ky. mine run	Chicago	5.00	1.45	1.15	1.10@ 1.25
South and Southwest					
Big Seam lump	Birmingham	2.35	3.05	3.05	**3.15@ 3.40**
Big Seam mine run	Birmingham	2.15	2.05	2.05	1.85@ 2.25
Big Seam (washed)	Birmingham	2.40	2.35	2.35	2.25@ 2.50
S. E. Ky. lump	Chicago	3.75	3.25	3.25	3.00@ 3.50
S. E. Ky. mine run	Chicago	3.65	2.35	2.35	2.25@ 2.50
S. E. Ky. lump	Louisville	3.90	3.35	3.25	*2.50@ 3.00*
S. E. Ky. mine run	Louisville	3.70	2.10	2.00	*1.50@ 2.25*
S. E. Ky. screenings	Louisville	3.50	1.35	1.25	*.90@ 1.25*
S. E. Ky. lump	Cincinnati	3.90	3.25	3.10	**3.00@ 3.50**
S. E. Ky. mine run	Cincinnati	3.75	1.60	1.75	*1.40@ 1.85*
S. E. Ky. screenings	Cincinnati	3.25	1.10	1.00	**.85@ 1.25**
Kansas lump	Kansas City	5.00	4.00	4.00	3.50@ 4.50
Kansas mine run	Kansas City	4.25	3.25	3.25	3.00@ 3.50
Kansas screenings	Kansas City	2.80	2.60	2.60	2.50@ 2.75

* Gross tons, f.o.b. vessel, Hampton Roads.
† Advances over previous week shown in heavy type, declines in *italics*.

Current Quotations—Spot Prices, Anthracite—Gross Tons, F.O.B. Mines

	Market Quoted	Freight Rates	Latest Pre-Strike Independent	Latest Pre-Strike Company	July 2, 1923 Independent	July 2, 1923 Company	July 9, 1923† Independent	July 9, 1923† Company
Broken	New York	$2.34	....	$7.60@$7.75	....	$7.75@$8.35	....	$7.75@$8.35
Broken	Philadelphia	2.39	$7.00@$7.50	7.75@ 7.85	....	7.00@ 8.10	....	7.00@ 8.10
Egg	New York	2.34	7.60@ 7.75	7.60@ 7.85	$8.50@11.50	8.00@ 8.35	**$8.50@$12.00**	8.00@ 8.35
Egg	Philadelphia	2.39	7.25@ 7.75	7.75	9.25@10.50	8.10@ 8.35	**9.25@11.00**	8.10@ 8.35
Egg	Chicago*	5.06	7.50	8.25	7.60@10.25	7.25@ 7.45	**8.50@12.00**	7.25@ 7.45
Stove	New York	2.34	7.90@ 8.20	7.90@ 8.10	8.50@11.50	8.00@ 8.35	**8.50@12.00**	8.00@ 8.35
Stove	Philadelphia	2.39	7.85@ 8.10	8.05@ 8.25	9.25@10.00	8.15@ 8.35	**9.25@11.00**	8.15@ 8.35
Stove	Chicago*	5.06	7.75	8.25	7.60@10.25	7.25@ 7.45	**8.50@12.00**	7.25@ 7.45
Chestnut	New York	2.34	7.90@ 8.20	7.90@ 8.20	8.50@11.00	8.00@ 8.35	**8.50@12.00**	8.00@ 8.35
Chestnut	Philadelphia	2.39	7.85@ 8.10	8.05@ 8.15	9.25@10.50	8.15@ 8.35	**9.25@11.00**	8.15@ 8.35
Chestnut	Chicago*	5.06	7.75	8.25	7.60@10.25	7.25@ 7.45	**8.50@12.00**	7.25@ 7.45
Ranges	New York	2.34	....	....	....	8.30	....	8.30
Pea	New York	2.22	5.00@ 5.75	5.75@ 6.45	7.25@ 8.00	6.00@ 6.30	*6.75@ 8.00*	6.00@ 6.30
Pea	Philadelphia	2.14	5.50@ 6.00	6.10@ 6.25	7.00@ 7.35	6.15@ 6.20	**7.00@ 7.50**	6.15@ 6.20
Pea	Chicago*	4.79	6.00	6.25	6.25@ 7.25	5.50@ 5.65	**7.00@ 8.50**	5.30@ 5.65
Buckwheat No. 1	New York	2.22	2.75@ 3.00	3.50	2.75@ 3.50	3.50@ 4.15	2.75@ 3.50	3.50@ 4.15
Buckwheat No. 1	Philadelphia	2.14	2.75@ 3.25	3.50	2.75@ 3.50	3.50	2.75@ 3.50	3.50
Rice	New York	2.22	2.00@ 2.50	2.50	2.00@ 2.50	2.50	*1.80@ 2.50*	2.50
Rice	Philadelphia	2.14	2.00@ 2.50	2.50	1.75@ 2.50	2.50	1.75@ 2.50	2.50
Barley	New York	2.22	1.50@ 1.85	1.50	1.25@ 1.50	1.50	1.25@ 1.50	1.50
Barley	Philadelphia	2.14	1.50@ 1.75	1.50	1.15@ 1.50	1.50	1.15@ 1.50	1.50
Birdseye	New York	2.22	....	2.00@ 2.50	....	1.60	....	1.60

*Net tons, f.o.b. mines †Advances over previous week shown in heavy type, declines in *italics*.



Coal Age Index of Spot Prices Bituminous Coal F.O.B. Mines

	1923 July 9	1923 July 2	1923 June 25	1922, July 10
Index	197	203	205	301
Weighted average price	$2.38	2.46	$2.48	$3.64

This diagram shows the relative, not the actual, prices on fourteen coals, representative of nearly 90 per cent of the bituminous output of the United States weighted first with respect to the proportions each of slack, prepared and run-of-mine normally shipped, and second, with respect to the tonnage of each normally produced. The average thus obtained was compared with the average for the twelve months ended June, 1914, as 100, after the manner adopted in the report on "Prices of Coal and Coke, 1913, 1918," published by the Geological Survey and the War Industries Board.

ings have sold under $4.25, which is considered standard at present. There is general talk of a 50c. anthracite advance in everything but buckwheat, to take effect Aug. 1.

The Milwaukee market continues dull. Demand from the city and immediate vicinity is very slow. Country consumers are doing most of the ordering now. Prices hold steady.

Doldrums Prevail in Southwest

The Southwest is still marking time. With two Kansas City retail boosts in Arkansas semi-anthracite in as many

months, and the promise of another 50c. advance at the end of this month, householders still are showing no interest in storing. There has been no change in Kansas prices, and operators say there is no immediate prospect of any. Threshing demand and industrial contracts keep the mines open one or two days a week.

The market in Colorado is inactive. No changes have been made in lignite prices. Industrial market for lignite is unsteady. Little or no slack is being made and there is a low supply of mine run. Prices increased 25c. on bituminous and semi-anthracite lump and nut July 1.

In Utah it is likely the present shortage rate will continue a few more weeks.

Buyers Scarce in Ohio Markets

Business at Cincinnati is practically at a standstill, following the holiday. Buyers are scarce with most of the tonnage moved going to the steel mills. West Virginia 2-in. lump is quoted at $2.50@$3, as compared with $2.50@$2.75 last week and southeastern Kentucky 2-in. lump at $2.50@$3, as compared with $2.50@$2.75. Conditions at Columbus are unsettled, with buying reduced to a minimum. Steam-coal users are in the market only for immediate needs, while there is a fair demand by the railroads and public utilities. Manufacturers are buying in the open market at low prices. With more mines closing, distressed coals are being gradually reduced. Production in the Eastern Ohio No. 8 district declined slightly during the week ended June 30 as compared with the previous week, the mines operating about 65 per cent of full time. The steam and retail trade is quiet. Fewer mines are in operation in northern West Virginia than there were in June, due to market conditions and low prices. Demand is lacking.

The weakness in the Pittsburgh market last week was in gas lump coal, in which there was a marked falling off in demand, due in part to a slight decline in steel operations. The Buffalo market is dull, with plenty of coal on hand awaiting buyers.

Dullness Continues in New England

In the New England market there is no material change. Quotations are only nominal, for the most part, and consumers show little interest. Buying is restricted almost entirely to small purchases for users of small tonnages and the trade sees little prospect of improvement during July.

At Hampton Roads there is little inquiry. Prices f.o.b. vessel receded to $5 per gross ton for Navy Standard coals, with a few sales of No. 2 grades for $4.75 and less. The volume of coal changing hands is very light indeed, and wholesale curtailment at the mines will soon so affect the available supply as to make it extremely difficult to put together a cargo of a few thousand tons except by bidding a figure higher than anything recently quoted. On the strength of this situation some of the agencies are predicting quotations of over $6 in the near future.

Seaboard Market Dull but Optimistic

Demand is slow at New York tidewater, with quotations for most coals easier. Producers and shippers are optimistic however, and look for increased interest within the next few weeks. High-grade coals showed a tendency of being a little scarce in the Philadelphia market after the holiday, especially with those users who buy only for immediate needs and demand quick delivery. The soft-coal market at Baltimore is spotty, although the healthy export demand gives it a better tone than it otherwise would have. Buying at Birmingham is practically at a standstill.

There was a considerable drop in lake movement to Duluth last week because many boats went up light after ore, in order to prevent vessels being tied up over the holiday. Only fifty cargoes arrived during the week, of which eight contained anthracite. It is estimated that on June 1 there was in stock at Duluth 3,000,000 tons of bituminous coal and 200,000 tons of anthracite. Up to July 5 there had been received at Milwaukee 327,519 tons of anthracite and 1,142,881 tons of bituminous coal. Dumpings at Lake Erie ports during the week ended July 9 was 1,017,973 net tons of cargo coal and 54,854 tons of fuel coal, making the total dumpings for the season 11,290,657 tons.

Anthracite Consumers Show Interest

Now that the demands of the anthracite miners have been presented to the operators, consumers are becoming a little more anxious regarding their next winter's fuel. At the New York tidewater, however, retail dealers are not buying any more of the independent product than is absolutely necessary, but it is said that demand inland is heavy. As is the case in New York, retail dealers in Philadelphia have sufficient orders booked to carry them through the next few months. Dealers at Baltimore have received more orders since the demands of the miners have become known.

Anthracite production during the week ended June 30 was well over the 2,000,000-ton mark, says the Geological Survey. According to reports from the nine principal anthracite carriers, 39,901 cars were loaded, from which it is estimated the total output, including mine fuel, local sales, and product of washeries and dredges, was 2,087,000 tons.

Car Loadings, Surplusages and Shortages

	Cars Loaded All Cars	Cars Loaded Coal Cars
Week ended June 23, 1923	1,002,740	183,350
Previous week	1,007,253	187,009
Same week in 1922	866,321	96,204

	Surplus Cars All Cars	Surplus Cars Coal Cars	Car Shortage	
June 22, 1923	58,671	4,269	11,896	7,976
Same date in 1922	255,685	160,733	......	......
June 14, 1923	51,988	3,129	12,787	9,257

Foreign Market And Export News

Better Inquiry for Welsh Coals

There was a further decline in Great Britain's coal output during the week ended June 23, when 5,588,000 tons were produced, says a cable to *Coal Age*. The output for the previous week was 5,651,000 tons and for the week ended June 9 5,654,000 tons.

The Welsh coal market is quiet but unsettled, and new business is very restricted. The decline in prices in the last two weeks has resulted in better inquiry.

Welsh anthracite coal is an exception to the general rule. The production of the best classes of anthracite has not kept up with demand, and this coal still sells at top figures. Rail and dock facilities at Welsh ports have considerably improved.

There is a slight improvement in the Newcastle market.

French Coal Market in Good Condition

The French coal situation is in good condition. Demand for domestic coals is active while industrial coals which had become much easier are again strong. The industrial activity in the north of France particularly in the textile trades, is now satisfactory.

Coal imports from Great Britain have declined somewhat. Receipts from South Wales during the week ended June 10 were 170,000 tons as compared with 270,000 tons the previous week.

From June 1 to June 10 the French Office des Houillères Sinistrées received from occupied German territories 69,000 metric tons of coal, 56,000 tons of coke and 8,000 tons of lignite briquets.

Since June 10 shipments from the Ruhr, especially of coke, have marked a substantial increase.

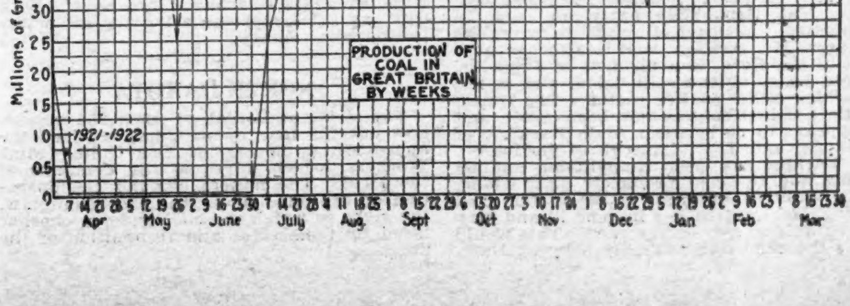
Prices at Hampton Roads Decline

Business at Hampton Roads last week continued to drag, in the face of declining prices, which reached the lowest level since 1921. Some slight decrease in dumpings was recorded.

Foreign business held fairly strong, while bunkers was good, but coastwise trade showed a reaction to the season's laxity. Reports indicated that a number of operations in West Virginia and southwest Virginia are about to close down, because of the falling prices and the slump in demand.

Hampton Roads Pier Situation

N. & W. piers, Lamberts Pt.:	June 28	July 5
Cars on hand	1,051	1,347
Tons on hand	61,210	91,724
Tons dumped for week	111,278	82,941
Tonnage waiting	3,175	3,550
Virginian Ry. piers, Sewalls Pt.:		
Cars on hand	1,820	1,963
Tons on hand	103,530	109,760
Tons dumped for week	80,896	91,281
Tonnage waiting	16,950	26,400
C. & O. piers, Newport News:		
Cars on hand	2,564	1,752
Tons on hand	127,579	88,645
Tons dumped for week	125,648	123,876
Tonnage waiting	9,090	10,600



Export Clearances, Week Ended July 7, 1923

FROM BALTIMORE

	Net Tons
For Chile:	
Br. SS. Chertsey	4,512
For France:	
Br. SS. Hypatia	8,645
Swed. SS. Alstren	5,214
Jap. SS. Raifuki Maru	8,600
Nor. SS. Romsdalshorn	10,554
For Holland:	
Jap. SS. San Francisco Maru	7,900
For Italy:	
Ital. SS. Giovanni	11,674
Fr. SS. Pytheas	9,100
Ital. SS. Livenza	8,500
Ital. SS. Aster	10,626
Fr. SS. Pytheas (Coke)	75

FROM PHILADELPHIA

For Chile:	
Jap. SS. Atlantic Marua, for Valparaiso	....
For Cuba:	
Nor. SS. Geflon, for Havana	....
For France:	
Br SS. Elswick House, for Dunkirk	....
Swed. Motorship Luossa, for Dunkirk	....

FROM HAMPTON ROADS

For Brazil:	
Br. SS. Virgil, for Pernambuco	479
For Canada:	
Br. SS. Hartfield, for Montreal	6,596
Br. SS. Stanmore, for Three Rivers	6,814
For Cuba:	
Swed. SS. Colombia, for Santiago de Cuba	2,071
Nor. SS. Tonjer, for Havana	4,969
For France:	
Span. SS. Igotz Mendl, for Marseilles	6,133
For Holland:	
Du. SS. Aldebaran, for Rotterdam	11,087
Du. SS. Gemma, for Rotterdam	11,282
For West Indies:	
Nor. SS. Christian Michelsen, for Fort de France	4,892
Dan. SS. Norden, for Barbados	4,059

Pier and Bunker Prices, Gross Tons

PIERS

	June 30	July 7†
Pool 9, New York	\$5.50@\$6.00	\$5.50@\$6.00
Pool 10, New York	5.00@ 5.35	5.00@ 5.35
Pool 11, New York	4.50@ 4.75	**4.50@ 4.85**
Pool 9, Philadelphia	5.40@ 5.80	*5.35@ 5.75*
Pool 10, Philadelphia	4.50@ 5.30	*4.45@ 5.25*
Pool 11, Philadelphia	3.70@ 4.35	3.70@ 4.35
Pool 1, Hamp. Roads	5.50	*5.00@ 5.25*
Pools 5-6-7, Hamp. Rds.	4.50	*4.25@ 4.50*
Pool 2, Hamp. Roads	5.35	*5.00*

BUNKERS

	June 30	July 7†
Pool 9, New York	5.80@ 6.30	5.80@ 6.30
Pool 10, New York	5.30@ 5.65	5.30@ 5.65
Pool 11, New York	4.80@ 5.05	**4.80@ 5.15**
Pool 9, Philadelphia	5.80@ 6.00	*5.75@ 6.00*
Pool 10, Philadelphia	4.80@ 5.55	*4.75@ 5.50*
Pool 11, Philadelphia	3.95@ 4.70	*3.90@ 4.65*
Pool 1, Hamp. Roads	5.50	*5.00@ 5.25*
Pool 2, Hamp. Roads	5.35	*5.00*

Current Quotations British Coal f.o.b. Port, Gross Tons

Quotations, by Cable to *Coal Age*

	June 30	July 7†
Admiralty, large	30s.	31s.@32s.6d.
Steam smalls	23s.@24s.	22s.6d.@25s.
Newcastle:		
Best steams	26s.6d.@27s.	26s.@27s.
Best gas	30s.	30s.
Best bunkers	28s.@30s.	28s.@29s.

† Advances over previous week shown in **heavy type**, declines in *italics*.

News Items From Field and Trade

ALABAMA

The Pratt Consolidated Coal Co. is constructing a long sidetrack from its present railroad connections to the site of several new drift mines which it is developing near Dora, in Walker County.

The union miners who have been on strike at the Beltona Mines of the American Fuel Co. for the past two months have been notified of the **withdrawal of strike benefits** which have been paid by the United Mine Workers since the men went out. Operation of the mine was not seriously crippled for any length of time, the places of the strikers being filled without much trouble. It is stated by an official of the company that no agreement of any kind was made with the men who have been on strike, the mine having operated on an open-shop basis for the past two months and will continue to do so. The Beltona local was perhaps the largest in the district working under a union agreement.

A meeting of dealers and exporters of coal at the Gulf ports will be held in Birmingham at an early date with operators, sales agents, representatives of railroads and others interested in the building up and further expansion of the bunkering and export outlet for Alabama coal. Matters of freight rates, handling facilities, standardization of grades and qualities and other germane subjects will receive attention in an effort to bring about a greatly increased consumption of coal from this source. It is believed that the coal trade with Central and South American countries, West Indies, Windward Islands and other foreign points can be greatly increased with the proper standardization, assuring purchasers of getting a supply of uniform and dependable quality of fuel.

ALASKA

E. L. Bedell and Leopold David of the Alaska Bituminous Coal Co., at Anchorage, have gone to Seattle to complete arrangements for exporting coal to that city. The coal will be mined in the Moose Creek fields, where a spur is being rushed to completion. Five hundred men will be employed in the mining operations, according to Mr. Bedell.

Coal mined in Alaska has been placed on the market, according to reports received by the Department of the Interior from the Alaska mining station of the Bureau of Mines. It is now being retailed at Juneau, capital of the territory, at a lower price than is asked for British Columbia coal. The coal being sold comes from the Suntrana field of Alaska. Further information is to the effect that the Suntrana coal is proving very satisfactory for household use. During the past month the Bureau of Mines collected and analyzed 250 samples of coal from the Matanuska and Nenana fields of Alaska.

COLORADO

Coal production in Colorado for the first five months of 1923 increased 691,000 tons over a similar period the preceding year, according to the report of the State Coal Mine Inspector, James Dalrymple, for the month of May. Total production for the period was 4,269,897 compared with 3,378,787 for 1922. Production for the month of May was 732,473 tons.

ILLINOIS

The United Electric Coal Co. of Danville, is opening a new coal tract between Danville and Oakwood. The new field is to the north of the old one. In getting one of the big shovels out of the old field into the new it was deemed necessary to cut slightly into a river levee, which weakened it. High water, with heavy currents caused two old properties to be flooded. No. 6 mine was not seriously damaged but the No. 1 strip mine was flooded to a depth of 30 feet, the large shovels being barely visible in the water. Pumps with a capacity of 500,000 gallons an hour are being used to clear the pits.

The Norwood-White Coal Co. has opened a new coal property between Herrold and Grimes. The vein is 200 ft. below the surfact and runs 4 to 5½ ft. in thickness and is uniform in depth over the entire holding of the company, which is approximately 1,000 acres. A shaft has been sunk and the superstructure erected and some coal has been hoisted.

The Oberheide Coal Co., 1355 Bradley Street, Chicago, has incorporated to mine and sell coal. The incorporators are: C. H. Oberheide, Fred Oberheide and William Oberheide.

Almost every official, great or small, involved in any way with the Herrin massacre of June 21, 1922, is charged with failure to properly perform his duty, a committee of the Illinois Legislature has reported after making an investigation. The committee condemned almost everybody except Governor Len Small, and omitted mention of that executive. Nothing of importance was developed by the committee. It complains because the State Senate blocked the continuance of the committee's work. A number of witnesses escaped appearing before the committee by the simple expedient of "disappearing" during the life of the committee.

George E. Haskins, purchasing agent, International Harvester Co., and **James A. Galligan,** assistant to the president, By-Products Coke Corporation, have resigned their positions to **become vice-presidents of W. H. Harris, Inc.,** Chicago, wholesale dealers in coal and coke. The name of the company will be changed to W. H. Harris & Co.

KANSAS

Coal production in Kansas in 1922 was more than half a million tons less than the production for 1921, according to the annual production report of P. E. Keegan, statistical clerk in the office of James Sherwood, chief state mining engineer. The tonnage in 1922 was 3,518,243, as compared with 4,028,625 tons produced in 1921. Nine deaths resulted from accidents in the mines in 1922, the report shows, compared with fourteen the year preceding. In producing the tonnage last year the mines worked an average of 139 days, with a total of 9,626 employees. In 1921 the mines worked 151 days with 10,416 men. The mines upon which the report is based were distributed over the state as follows: Deep mines—Crawford County, 179; Cherokee County, 101; Osage County, 24; Leavenworth County, 4; strip mines—Crawford County, 15; Cherokee County, 14.

KENTUCKY

In the opening address at the meeting of the Kentucky Tax Commissioners' Conference at Frankfort, June 27, Rainey T. Wells, member of the State Tax Commission, declared that since 1917 **the assessment of fourteen coal-producing counties of the State have been increased nearly 175 per cent,** while the increase on the 106 agricultural counties has been but 90 per cent. This increase on coal lands, he said, refuted charges made by the press that the coal lands of the state are escaping taxation.

The political situation in Kentucky has swung around until it now looks more favorable to the coal interests of the state in the fall gubernatorial election. There have been many prospective candidates, several of whom were favoring a coal tonnage tax and other heavy taxation on the operators, and have attacked licensed racetrack betting. The Republican party on June 26 nominated Charles I. Dawson to carry its banner. Mr. Dawson, who is attorney general of the state, is a resident of Pineville, in the heart of the coal fields, and is not attacking either coal or racing. The Democratic nomination has not been made, but it appears to be between Alvin Barkley, of Paducah, and J. C. Cantrill, of Lexington. Mr. Barkley has been campaigning against racing and the coal producers right along, while Cantrill appears to favor the coal trade. Mr. Cantrill has become ill and may not be able to stay in the race. This would leave the campaign probably between Dawson, Republican, and Barkley. Dawson will have the advantage because the State is normally Republican now.

MISSOURI

The Mendota Mining Co. has been incorporated at St. Joseph, Mo., with a capital of $200,000, and will do a general coal-operating business. The incorporators are Bertha C. Collins, J. J. Casey and J. H. Karnes.

The Co-operative Block Coal Co., of Macon, a large mine operated on the co-operative partnership basis by the miners, is meeting with success, and recently a dividend of 75c. per man per working day was declared by the company. This dividend is declared from the profits above operating expenses and goes to each man as a sort of a bonus over his $7.50 per day wage. The rather remarkable result has been achieved in a vein of unusually hard bituminous coal, running from 20 to 22 in. in thickness. The co-operative method has been employed at the mine for a year and a half.

MONTANA

The Northern Pacific Railway has been authorized by the Interstate Commerce Commission to **build a 31-mile branch line** into the coal fields of Rosebud County, over which to haul coal, primarily for its own use. Extensive deposits are said to exist in this district.

NEW YORK

Dividends declared and awaiting payment, as reported currently in the Annalist include the following coal companies:

	Rate	Per	Payable	Books close
Consol. Coal....	1½	Q	July 31	July 14
Davis Coal & Coke	$3	..	July 16	June 30
Del. L. & W. Coal	$1.25	Q	July 16	June 30
Lehigh Coal & Nav.	$1	Q	Aug. 31	July 31
Pittsburgh Coal.	1	Q	July 25	July 10
Pittsburgh Coal.	1½	Q	July 25	July 10
Sterling Coal...	1	..	July 3	June 20

Tentative awards for coal deliveries to State institutions recently announced by the State Department of Purchase, Albany, include the following: School of Agriculture, Delhi, 100 gross tons pea coal, to Perryman-Burns Coal Co., New York City, $9.49 per ton; State Normal School, Brockport, 30 gross tons chestnut and 600 gross tons grate coal, Brockport Coal Co., $15.28 per ton; State Normal School, Buffalo, 500 gross tons egg coal, George F. Francis, $14.29 per ton; State Reservation, Saratoga Springs, 600 net tons No. 1 buckwheat, Lee Coal Co., New York City, $5.99 per ton; State Normal School, Potsdam, 800 gross tons grate coal, 150 gross tons egg coal, and 125 net tons run of mine bituminous coal, to Eastern Fuel Co., New York City, at $16.04, $16.29 and $5.29 per ton each, respectively; State Normal School, Oneonta, 500 net tons ¾ lump, to Cleveland & Buffalo Coal Co., Buffalo, $5.72 per ton, and 100 gross tons egg and 20 gross tons chestnut coal to Oneonta Coal & Supply Corp., at $13.35 per ton each; State Normal School, Fredonia, 450 net tons 1½ lump coal, to Burton Coal Co., Buffalo, $4.64 per ton; Institute of Applied Agriculture, Farmingdale, 40 gross tons each of chestnut and stove coal, Martin F. Shea, New York City, $10.50 per ton, f.o.b. mine; 900 net tons run of mine bituminous coal, to Moreland Coal & Coke Co., Pittsburgh, $5.14 per ton delivered; Department of Public Buildings, Albany, 8,000 net tons buckwheat No. 1, to Martin F. Shea, New York City, at $5.64, and 825 gross tons stove coal, E. W. Howell Coal Co., Albany, at $13.40 per ton delivered in bins; Mattawan State Hospital, Beacon, 4,200 net tons, run of mine bituminous coal, to Shawnee Fuel Co., New York City, at $5.77 per ton.

Roger M. Magee has become associated with Fred D. Gearhart, Inc., New York City, as sales representative for all points in southern Jersey.

NORTH DAKOTA

The strike at Beulah of some 200 miners, now out for four months, has received the approval of officers of the United Mine Workers, which approves the demands of the local. The miners demand the operation of the mine under the eight-hour law, the right to weigh the coal under a checker hired by themselves and recognition of the union.

OHIO

A deal is about to be closed for the sale of the interests of Henry Watkins in the Consolidated Mining Co., which has properties in the Hocking Valley, to **A. L. Groff** of New Straitsville, and **F. A. Sharshall,** of Shawnee. It is believed that another corporation will be organized to take over the property.

The Raven Coal Mining Co., Steubenville, has been chartered with a capital of $300,000 to operate coal mines and sell coal and coke. Incorporators are Lee Van Tilburg, R. D. Stone, John Peterson, E. M. Morrow and M. H. Francis.

Among Cleveland coal companies chartered recently are **the American Fuel Co.,** with an authorized capital of $100,000, to produce and sell coal, by E. W. Leeper and others, and **the Denison Coal & Supply Co.,** a retail concern with a capital of $25,000 by George A. Naul and others.

Trans-Michigan-Ohio railroad shippers' advisory committee to give the receivers and senders of freight a voice in opinion and car service problems of the railroads was formed in Toledo recently. L. G. Macomber, traffic commissioner of the Chamber of Commerce, Toledo, was named chairman; H. M. Griggs, manager of the Ore & Coal Exchange, Cleveland, was named vice-chairman, and F. H. Baer, traffic commissioner of the Cleveland Chamber of Commerce, was elected secretary.

OKLAHOMA

The Arkansas Fuel Co. has been incorporated in McAlester, with a capital of $10,000, by E. P. Joyner and J. G. Puterbaugh, both of McAlester, and T. H. Niles, of Muskogee.

The mines and washer of the **Howe & McCurtain Coal & Coke Co.** at Howe were reopened July 1, when construction work was completed.

PENNSYLVANIA

The following bituminous coal companies were incorporated recently at the State Department: **Ringgold Coal Co.,** mining and preparing coal for the market; Timblin; capital, $24,000; incorporators, H. E. Kordes, Timblin, treasurer; J. F. Young, Mayport, R. D. 4, and W. R. Freas, Ringgold. **Turkey Hollow Coal Co.,** Monessen, mining and preparing coal for the market; $50,000; incorporators, C. F. Thomas, O. G. Frazier and M. H. Bamford, Denora; Eli H. Wolf, Monessen, treasurer. **Reed Coal Mining Co.,** mining, quarrying, coal, stone and clay; Bakerton, P. O. Elmora; $5,000; incorporators, Robert P. Reed, Bakerton, treasurer; Edgar P. Reed, Bakerton, and Walter Jones, Ebensburg.

Thirty-eight coal-producing companies during the past spring planted 1,137,175 trees, according to the State Forestry Department. These trees reforested 1,200 acres of idle land, and when they reach maturity they will yield at least 36,000,000 board ft. of lumber.

Important issues are raised in **a strike of coal miners which has continued for two months or more at the Cramer shaft** of the Northwestern Mining & Exchange Co., generally regarded as the Erie R.R. interests' bituminous asset, near DuBois, Clearfield County. One of the results of the strike may be a suit against the United Mine Workers, District No. 2, for monetary damages based on the actual financial loss caused by eight or ten weeks' stoppage of work and failure to deliver coal. Employees of the Cramer shaft struck to enforce a demand that a wage differential be paid there because, as they allege, the coal seam is thin. After exhausting all other methods of obtaining an adjustment of the issue on the scale basis, the board has appealed to the board of arbitration in the district.

When a wreck occurred in the Pennsylvania R.R. east-bound tunnel about three miles east of Spruce Creek, June 22, one of the Bethlehem Mines Corporation's mine-rescue teams, in charge of Edmund Williams, trainer, and Special Mining Engineer J. W. Bair, was rushed to the wreck, all men supplied with helmets and all necessary first-aid equipment. Seven of the railroad workmen overcome by heat and smoke were brought outside and given first-aid treatment by members of the U. S. Bureau of Mines rescue car, Red Cross nurses, and the Bethlehem rescue team. The Bethlehem team was held at the tunnel until noon of the following day, when all danger was past.

The late **Captain W. A. May,** president of the Pennsylvania Coal Co., and Hillside Coal & Iron Co., left personal property valued at $457,935.04, according to an inventory filed with Register of Wills Harry T. Madden, at Scranton. One of the items inventoried is salary due June 1, $3,333.33. The inventory does not disclose if this represents one month's salary.

An agreement has been reached by counsel to continue trial of the case of the Scranton Coal Co. against the Richter Coal Co. without a jury, saving 300 pages of testimony from going into the discard. A jury was empanelled last January and since that time two jurors have died. A recess was taken in March. The case will now be heard by Judge William T. Maxwell, of Towanda. Before the taking of testimony is resumed it is intended that all parties to the litigation, including Judge Maxwell, shall visit the property in dispute, known as the Canevin tract.

The Blue Lick Coal Co., which has recently been incorporated, contemplates the largest development in the history of the Meyersdale field. The promoters are Frederick Rowe, Frederick E. Rowe, Clarence F. Rowe and Clyde J. Rowe, all well known coal operators and residents of Myersdale, with the exception of Clyde J. Rowe, a resident of Frostburg, who has oversight of the Rowe coal mining properties in the vicinity of Mount Savage and north to Wellersburg.

An appeal will be taken by the companies involved against assessments of $400,000,000 on the coal lands of Schuylkill County which includes an absolute increase of about $325,000,000. Already 150 appeals have been filed. Some of the companies have paid their taxes under protest and some others have paid hundreds of dollars in penalties. If the companies lose in their law suits they will be obliged to pay one-half of the total taxes in the coal region towns hereafter and their officers have asserted that they cannot pay such heavy taxes, especially where the coal lands, as in Pottsville, are not being actively mined.

The Penn Central Light & Power Co., Altoona, **has purchased a tract of 2,500 acres of coal land** in Broad Top township, Bedford County, from the Kay Coal Mining Co., for $230,000. The coal land is situated near the new Saxton power plant now being constructed by the Penn Central.

UTAH

The Sevier Valley Coal Co., of Richfield, has increased its capital stock from $250,000 to $500,000. This is in order that greater development of the property may be made.

VIRGINIA

The Dominion Coal Co., Sydney, N. S., has ordered twelve colliers to Norfolk to load coal for Canada, on account of the strike of miners there. The coal for this shipment is on hand at the piers and can be loaded without delay. It is expected the ships will take in the neighborhood of 100,000 tons on each trip.

The Supreme Court of Appeals will review the case of the State of Virginia against Castner, Curran & Bullit, coal operators and steamship owners, for collection of taxes on business during 1916-1918. The company is chartered in New Jersey, but was taxed in Virginia, and the Virginia courts have upheld the company. The state will appeal the case.

WEST VIRGINIA

During the last week of June a deal was consummated in the Winding Gulf district under the terms of which the plants, assets and properties of the **Lynwin Coal Co.** at Mistletoe, on the Virginian Ry. were **purchased by John A. Boone,** of Beckley.

Walter R. Thurmond, of Logan, formerly president of the Logan Operators Association and one of the leading operators in the Logan district, in association with others **has organized the Logan Eagle Collieries Co.,** for the purpose of operating on an extensive scale in the Logan field. The new concern is capitalized at $500,000. Associated with Mr. Thurmond are his father, J. S. Thurmond; J. Cary Alderson, W. R. Lilly, of Logan, and Angus MacDonald, of Charleston.

The Pax Mining Co. has increased its capital from $100,000 to $300,000. The capital stock of the Deep Hollow Coal Co. has been decreased from $50,000 to $10,000.

The following foreign coal corporations have been authorized to transact business in West Virginia: Bertha-Consumers Co., of which John H. Jones, of 1203 Chamber of Commerce Building, Pittsburgh, Pa., is president; Brydon Brothers Coal Corporation, of Maryland, of which Harry G. Fisher, of Keyser, W. Va., is secretary; Dundonald Coal Co., incorporated under the laws of Delaware, of which W. G. Cochrane, of Tioga, W. Va., is secretary; Atlas Coal & Coke Co., of Chicago, Ill.

The Moke Co-operative Coal Co., which has been operated for just about a year under the co-operative plan, with all workers owning stock in the mine, has held its first meeting of stockholders since the organization of the company in June, 1922, and has elected the following officers and directors; W. L. Moke, of Clarksburg, president; F. M. Wattles, of New York, vice president; R. F. Holden, of Clarksburg, secretary-treasurer; John McNicol and John Elliott, directors. Officers of the company assert that under the co-operative system the company has been highly successful, operating without interruption since the company was organized except at such times as lack of cars made operation impossible.

Increased production at the mines of the Consolidation Coal Co. in the Georges Creek field as a result of the larger number of men at work is due to the fact that over 100 men who had been on strike since April, 1922, returned to work during the closing days of June, so that the company now has a working force of about 850 men. With men returning to work at this rate, the backbone of the strike in the Georges Creek region has been broken, operators assert, notwithstanding the fact that the strikers are receiving about $40,000 a week in benefits from the International union. No striking miner who has applied for work has been turned down, it is stated.

WASHINGTON

E. P. Lucas, general manager of the Bellingham coal mines, was elected **president of the Washington Coal Producers' Association** June 21. The association includes most of the open-shop operators of the state. **Prescott Oakes,** president of the Roslyn Fuel Co., was chosen vice-president and **W. E. Maltby** was re-elected secretary-manager.

CANADA

Output of coal from Canadian mines during March, according to the monthly report of the Dominion Bureau of Statistics, **amounted to 1,457,000 net tons,** a decrease of 11 per cent from the total for the previous month but an increase of 12 per cent over the average for that month during the preceding three years. Production in Alberta showed a decrease of 202,000 tons and in Saskatchewan 2,000 tons, while the output for British Columbia was the same. Nova Scotia and New Brunswick reported increases of 24,000 and 3,000 tons respectively. The cumulative output from all mines for the first three months of 1923 amounted to 4,858,400 tons, which was 22 per cent above the three-year average for that period. Imports of coal during March were 1,817,700 tons, compared with 1,326,200 tons during **February.** Total importations during the three months were 4,785,600 tons, an increase of 33 per cent over the three-year average for the period. Exports of Canadian coal in March were 284,500 tons, compared with 185,000 tons in February. Comparison of March exports with the preceding three-year average for that month showed an increase of 41 per cent.

The steel and coal industries of the **British Empire Steel Corporation** at Cape Breton have been **completely tied up by a strike** of 8,000 coal miners who went out in sympathy with the steel workers who were striking for increased pay and the establishment of the check-off system. Troops were sent to maintain order and the miners demanded the withdrawal of the soldiers. Serious rioting has occurred but the presence of the military has restored order.

Obituary

Death has claimed **M. S. Browning,** of Ogden, Utah, widely known capitalist and director in the Lion Coal Co., of that city. Mr. Browning died in the office of an attorney friend. He was 63 years of age.

Association Activities

Once again J. G. Bradley, former president of the National Coal Association, was elected as president of the **West Virginia Coal Association** at the annual meeting of that organization held during the convention of the National Coal Association at Atlantic City recently. Mr. Bradley is president of the Elk River Coal & Lumber Co. Ever since the West Virginia Coal Association was revived during the war, Mr. Bradley has been chosen year after year as its head. Vice presidents elected at the Atlantic City meeting were Everett Drennen, president of the West Virginia Coal & Coke Co., of Elkins, W. Va., and G. H. Caperton, of Charleston, W. Va. Walter H. Cunningham, who has served the association long and faithfully, was again chosen as the secretary of the organization.

The Colorado & New Mexico Coal Operators Association held its annual meeting and eletion of officers June 21 at the Denver Athletic club in Denver, Colo. Traffic problems were principal points of discussion. The following directors were elected: J. F. Welborn, J. J. Roche, W. H. Huff, F. R. Wood, S. M. Perry, Frank Bulkley, L. A. Hayden, J. Van Houten, H. F. Nash, W. D. Brennen and S. S. Murphy. All are prominent western operators. Following the meeting of the board of directors, these officers were selected: F. R. Wood, president; H. F. Nash, vice-president, and F. O. Sandstrom, re-elected secretary-treasurer and traffic manager.

Recent Patents

Breaker Plate for Crushers. Arthur F. Williams, St. Louis, Mo., assignor to Williams Patent Crusher & Pulverizer Co., St. Louis, Mo.; 1,440,429. Jan. 2, 1923. Filed Sept. 1, 1922; serial No. 585,739.

Mining and Loading Machine. Edmund C. Morgan, New York, N. Y.; 1,440,791. Jan. 2, 1923. Filed Sept. 18, 1915; serial No. 51,332. Renewed Oct. 15, 1919; serial No. 330,854.

Shoveling Machine. D. C. Corner, St. Louis, Mo.; 1,441,216. Jan. 9, 1923. Filed April 1, 1921; serial No. 457,640.

Loading Machine. R. P. Greenleaf, Cleveland, Ohio, assignor to Frank Billings, Cleveland, Ohio; 1,442,939. Jan. 23, 1923. Filed July 23, 1920; serial No. 398,467.

Coaling Barge. L. S. Rosener, San Francisco, Calif.; 1,443,044. Jan. 23, 1923. Filed June 8, 1921; serial No. 475,909.

Rock Drill. C. C. Hansen, Easton, Pa., assignor to Ingersoll-Rand Co., New York City; 1,443,128. Jan. 23, 1923. Filed Dec. 29, 1921; serial No. 525,711.

Rope Thrusting Shovel. Walter Ferris, Milwaukee, Wis., assignor to the Bucyrus Co., South Milwaukee, Wis.; 1,443,353. Jan. 30, 1923. Filed Aug. 3, 1921; serial No. 489,407.

Coke Briquets. Wm. E. Davies, London, Eng.; 1,443,618. Jan. 30, 1923. Filed Dec. 20, 1918; serial No. 267,729. Renewed July 13, 1922; serial No. 574,864.

Belt Feed for Picking Tables. Archibald R. Stephen, Lodi, Calif.; 1,443,659. Jan. 30, 1923. Filed April 15, 1922; serial No. 553,260.

Mine-Car Door. Emil F. Tubach, Dushore, Pa., assignor of one-half to Arthur L. Tubach, Dushore, Pa.; 1,443,857. Jan. 30, 1923. Filed Dec. 30, 1921; serial No. 525,962.

Safety Retaining Mechanism for Mine Cages, Lifts, etc. Herbert Lydeard, Swindon, England; 1,443,882. Jan. 30, 1923. Filed June 19, 1922; serial No. 569,403.

Trade Literature

Pennsylvania Hammer Crushers. Pennsylvania Crusher Co., Philadelphia, Pa. Bulletin 1005. Pp. 15; 8x11 in.; illustrated. The armorframe single-roll coal crusher and steel-built top-feed hammer crusher are described on page 11, the former being built in capacities of 10 to 400 tons hourly for reducing run-of-mine bituminous coal to sizes required for automatic stokers and preparatory to pulverizing, and the latter specialized for preparing run-of-mine coal for stoker use and for the preliminary reduction in pulverized-fuel installations. Features of these crushers are their heavy fabricated unbreakable steel frames, all-steel rotor, adjustable steel cage and patented tramp iron separator.

The Sullivan "Turbinair" Hoist, Single Drum, Type "HA." Sullivan Machinery Co., Chicago, Ill. Bulletin 76C. Pp. 11; 6x9 in.; illustrated. This bulletin while a reprint of an earlier edition contains additional matter. This hoist meets the demand for a small, compact but powerful portable hoisting engine for numerous uses in mines.

Sullivan "Turbinair" Hoist, Double Drum Type "HDA." Sullivan Machinery Co., Chicago, Ill. Bulletin 76D. Pp. 15; 6x9 in.; illustrated. This bulletin, like No. 76C, is a reprint of an earlier edition and contains additional material.

Link-Belt Electric Hoists and Overhead Cranes. Link-Belt Co., Chicago, Ill. Book 480. Pp. 32; 8x11.; illustrated. This attractively bound book, in bright red cover, shows the many applications to which these hoists and cranes may be put.

Traffic News

The Baltimore & Ohio R.R. has announced the sale of the Sandy Valley & Elkhorn and Millers Creek railroads to the Consolidated Coal Co. and the sale of the Long Fork Ry. to the Chesapeake & Ohio R.R. The two transactions involve approximately $8,000,000, of which $6,000,000 is said to have been paid for the Sandy Valley & Elkhorn and Miller's Creek railroads and $2,000,000 for the Long Fork Ry. It was said by officials of the Baltimore & Ohio that the contract was closed pending approval of the Interstate Commerce Commission. Funds from the sale, it was stated, would be used to develop Baltimore & Ohio property in West Virginia.

From June 1 to June 15 this year, 4,934 new freight cars were placed in service by the railroads of the country, says the American Railway Association, bringing the total number of new freight cars placed in service since Jan. 1, 1923, up to 70,594. One hundred and forty-three new locomotives also were delivered and placed in service during the same period which brought the total number of new locomotives delivered since Jan. 1, 1923, up to 1,840. Of the new freight cars delivered by car builders to the railroads, coal cars, 28,757. The railroads on June 15 also had on order and awaiting delivery, 104,068 new freight cars, and 1,993 new locomotives.

Fewer freight cars are now in need of repair than at any time since January, 1921, according to reports filed July 2 by the carriers with the Car Service Division of the American Railway Association. These reports showed that on June 15 200,784 freight cars of various kinds, or 8.9 per cent of the total number on line, were in need of repair. This was a decrease of 10,982 since June 1, at which time there were 211,766, or 9.4 per cent. During the first 15 days in June, 1,280,277 freight cars were repaired and turned out of the shops. This was an increase of 102,320 freight cars over the number repaired during the period extending from May 15 to June 1.

Locomotives in need of repair on June 15 totaled 12,659, or 19.9 per cent of the total number on line, according to reports filed with the car service division of the American Railway Association. This was a decrease of 24 locomotives compared with the number in need of repair on June 1, at which time there were 12,683. The railroads of the country also repaired and turned out of the shops from June 1 to June 15 a total of 18,937 locomotives, compared with 21,406 during the last half of May.

The New York Central R.R. carried 2,255,616 net tons less of coal and coke in 1922 than it did in the previous year, as a result of the strikes in the anthracite and bituminous coal fields. During the twelve months ended Dec. 31 last 4,294,575 tons of anthracite was carried, as compared with 7,620,195 tons in 1921, 25,683,530 tons of bituminous as against 24,819,035 tons, and 736,430 tons of coke, as compared with 530,923 tons. Anthracite shipments decreased 3,325,620 tons, while bituminous and coke shipments increased 864,497 and 205,507 tons, respectively. Coal cars equipped for service on Dec. 31, 1922, numbered 55,621 as compared with 57,947 on the corresponding day of the previous year. There were 749,700 net tons of anthracite transported by the Boston & Albany R.R., one of the leased lines of the New York Central, during the year ended Dec. 31, 1922, as compared with 1,492,975 tons in the previous year, a decrease of 743,275 tons, while bituminous coal carried during the same period was 1,788,110 tons, as against 1,772,804 tons, an increase of 15,306 tons, and coke 132,689 tons as compared with 67,318 tons, an increase of 65,371 tons. Coal cars equipped for service on Dec. 31, 1922, numbered 1,446, as compared with 1,535 on the last day of the previous year. The Ohio Central Lines, also leased by the New York Central, carried 6,888 tons of anthracite, 6,005,996 tons of bituminous and 57,458 tons of coke during the year 1922. These lines had in service on Dec. 31, 1922, 13,229 coal and coke cars. The annual report of the New York Central R.R. states that mechanical facilities are being installed in the coal handling plant at Ashtabula Harbor, Ohio, for the transferring of coal from cars to fueling lighters and to tugs.

The Erie R.R. carried over its lines during the twelve months ended Dec. 31, 1922, 6,079,508 tons of anthracite, 7,797,689 tons of bituminous coal and 744,218 tons of coke, as compared with 9,973,637, 6,959,744 and 675,929 tons, respectively, in the previous twelve months. There was a decrease of $11,861,149.44 in revenue for hauling coal and coke, as compared with the previous year, receipts in 1922 being $21,353,924.49 as against $33,215,073.93 in 1921.

Weston Dodson & Co., Inc., has attacked the rates on birdseye anthracite in effect between Winton, Pa., and North Adams, Mass.

The Interstate Commerce Commission has ruled against the contention of the Anaconda Copper Mining Co. as to unreasonable charges on coke from Sunnyside, Utah, to Black Eagle, Mont.

Alfred C. Dent and **W. T. Smith,** vice-presidents of W. A. Harriman & Co., and **Joseph Kraus,** vice-president of the Union Trust Co., of Cleveland, were **elected directors of the Pittsburgh & West Virginia R.R. Co.,** on June 28, to represent the Tuttle-Harriman interests, following the closing of the latter's option on the 32,500 shares of stock of the railway company. The deal, involving approximately $2,215,000, was engineered by the Tuttle Coal Corporation and W. A. Harriman & Co. through their representatives. The purchase was made from the Metropolitan Life Insurance Co. C. E. Tuttle was elected a director of the Pittsburgh & West Virginia at a recent meeting. No new chairman of the board was elected. Besides electing directors to the Pittsburgh & West Virginia, the new interests elected A. C. Dent and C. E. Tuttle as directors of the West Side Belt Line, a subsidiary of the Pittsburgh & West Virginia.

Coming Meetings

Oklahoma Coal Operators' Association will hold its annual meeting Sept. 13 at McAlester, Okla. Secretary, A. C. Casey, McAlester, Okla.

Rocky Mountain Coal Mining Institute will hold its summer meeting Aug. 27 to 29 at Salt Lake City, Utah, in conjunction with the **International Safety and First-Aid Meet.** Secretary, Benedict Shubart, Denver, Colo.

National Safety Council will hold its twelfth annual safety convention at the Buffalo Statler Hotel, Buffalo, N. Y., Oct. 1-5. Managing director and secretary, W. H. Cameron, 168 No. Michigan Ave., Chicago, Ill.

The American Institute of Mining and Metallurgical Engineers will hold its annual meeting in Canada. The meeting will start Aug. 20 at Toronto and end Aug. 30 at Montreal. Secretary F. F. Sharpless, 29 West 39th Street, New York City.

Coal Mining Institute of America will hold its annual meeting Dec. 19, 20 and 21 at Pittsburgh, Pa. Secretary, H. D. Mason, Jr., Chamber of Commerce Building, Pittsburgh, Pa.

The American Mining Congress will hold its twenty-sixth annual convention in conjunction with the **National Exposition of Mines and Mining Equipment,** Sept. 24-29, at the Milwaukee Auditorium, Milwaukee, Wis. Secretary, J. F. Callbreath, Washington, D. C.

New York State Coal Merchants' Association will hold its annual convention on Sept. 10-12 at Sacandaga Park, N. Y. Executive secretary, G. W. F. Woodside, 250 Arkay Building, Albany, N. Y.